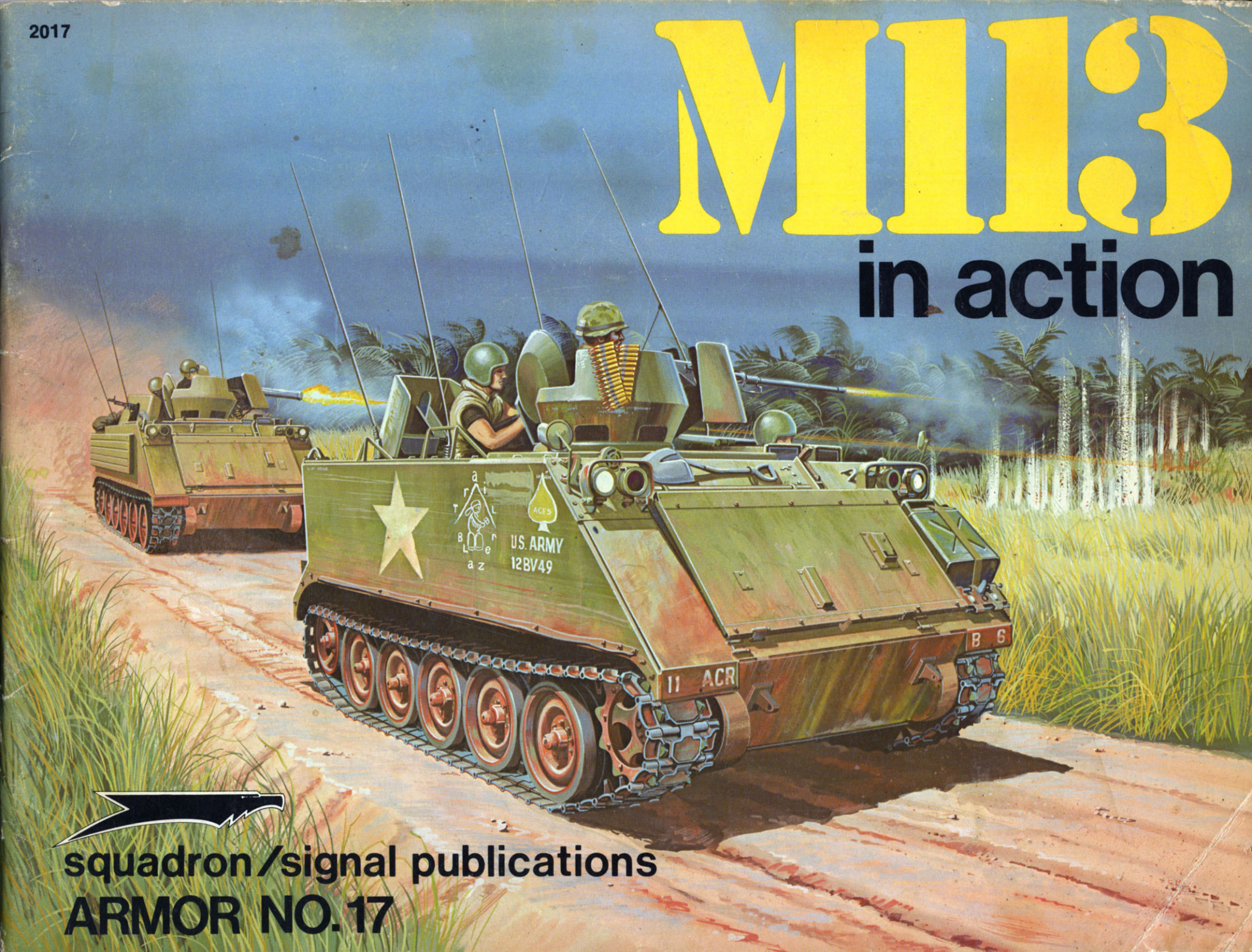
2017

M113 in action



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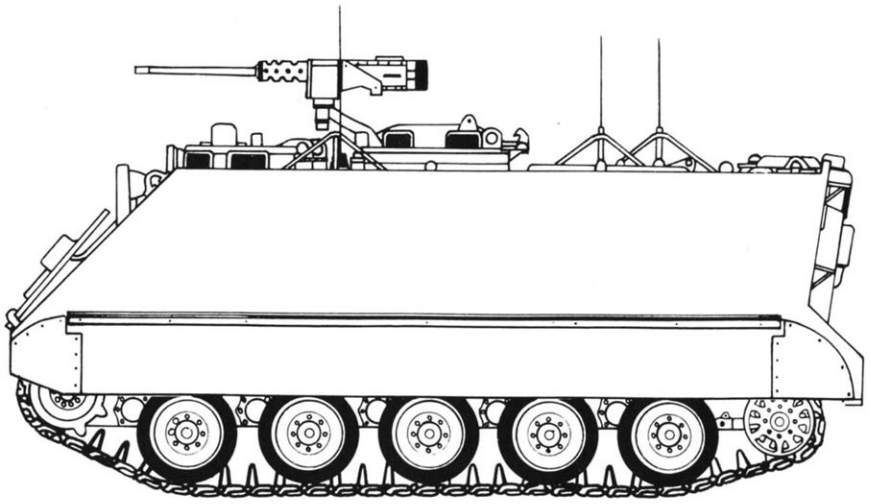
ARMOR NO. 17

M113 in action



by Stephen Tunbridge

illustrated by Don Greer
& Rob Stern

squadron/signal publications

[Cover] Two M113A1 ACAUs of the US Army spray a suspected VC concentration in the Delta region of Vietnam. The lead vehicle, "Trailblazer," has the standard ACAV modification, while the rear M113 has a rifle caliber mini-gun in the place of the .50 MG .

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Acknowledgements

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Author's Note

The M113 remains one of the most significant landmarks in the history of Armoured Fighting Vehicles. Despite truly impressive production figures, surprisingly little has been published on the M113. There are two reasons for this: Firstly, difficulty in obtaining information on recent developments owing to security reasons and secondly, the fact that records of the older developments have not been retained.

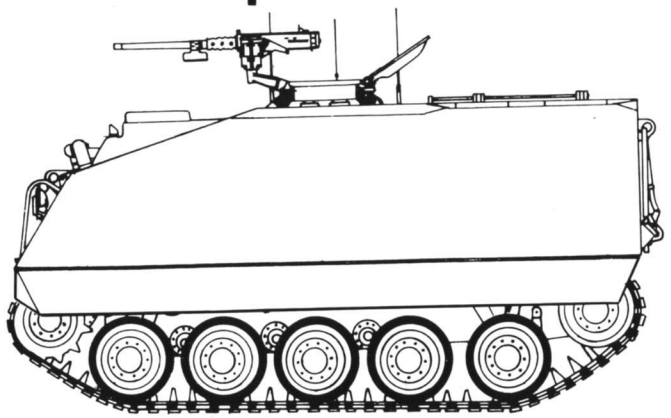
Primarily this book is an "In Action" coverage of the M113. Therefore, a balance has had to be struck between providing a representative choice of M113s operating in different circumstances and depicting the full range of variants which would necessitate encyclopedic treatment far outside the scope of the present publication. Each item of U.S. Armored equipment is prefixed by the letter "T" if experimental, and by the letter "M" if standard. Both the letters "T" and "M" are followed by a figure (e.g. T113 and M113). Where modifications and/or improvements have been made, the letter "E" followed by a number is added if experimental (T113E1 and T113E2), and the letter "A" followed by a number if standard (M113A1).

Since the early sixties, a slightly different designation system has been introduced. Any new project is designated by the letters "XM" followed by a number (XM806 and XM806E1). Once the project has been standardized, the letter "X" is dropped. (M806A1). Other abbreviations used in this book are:

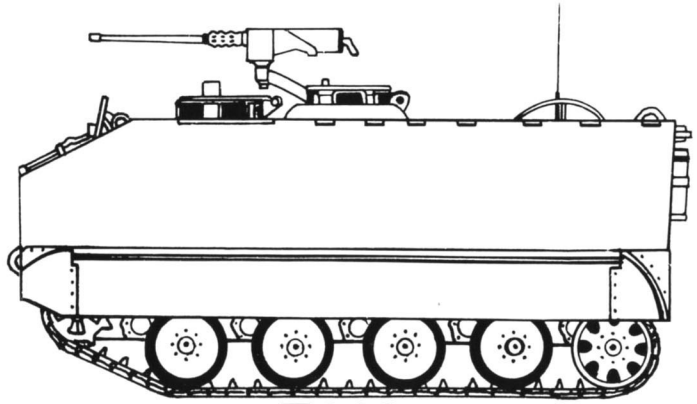
ACAV	Armored Cavalry Assault Vehicle	**IAFV**	Infantry Armored Fighting Vehicle
AIFV	Armored Infantry Fighting Vehicle	**MBT**	Main Battle Tank
APC	Armored Personnel Carrier	**MG**	Machine Gun
C+R	Command and Reconnaissance	**MICV**	Mechanized Infantry Combat Vehicle
FMC	Food Machinery Corporation	**PI**	Product Improved
HS	Hispano-Suiza		

[Right] A mud-covered U.S. M113 is seen here returning to base after a Reconnaissance in Force Mission in Vietnam, August 3, 1969. The vehicle belongs to Troop "A", 3rd Squadron, 4th Cavalry, 25th Infantry Division. This particular vehicle has been modified with the ACAV kit, intended to improve the firepower and protection of the crew. Also visible is a variety of optional stowage including rolled cyclone-fencing [used in setting up perimeters] and a number of folding cots. [US Army]

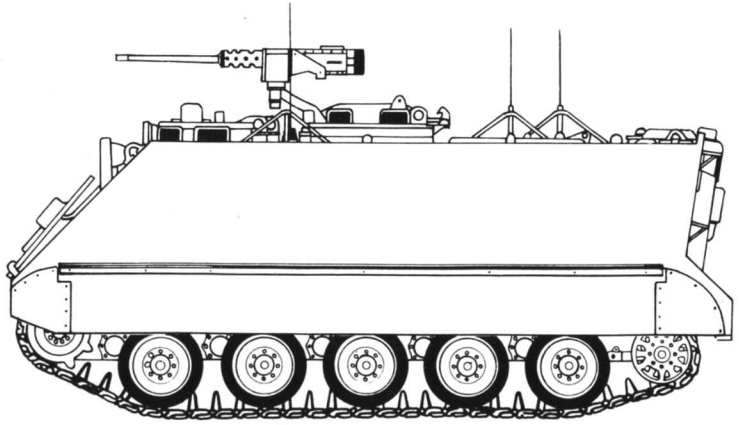
M113 Development



M75



T113



M113

The M113 Armored Personnel Carrier is in service with more than thirty armies throughout the world including the United States Army. More than 50,000 units have been produced covering 150 variants and versions during the last 20 years.

Initial design work for the M113 dates back to 1956 when the US Army called for an APC cheaper and lighter than the M75 then under consideration. In response to these requirements, evaluation studies were undertaken on:

T113 of aluminum construction (3 prototypes)
T117 of steel construction (5 prototypes)

Following the Korean War, demand for aluminum had reached an all-time low and producers endeavored to find new outlets for this material. At the same time the US Army had decided that there was a vital need for the bulk of military equipment to be air-transportable. As a direct result of these two complementary requirements and the fact that the T113 was marginally lighter than the T117, the decision was made for the new APC to be built of aluminum. The difference in weight was only one factor in the ultimate choice of vehicles since to obtain an equal degree of protection, aluminum armor had to be three times as thick as that of steel. However, rigidity of the aluminum hull was far greater which enabled a number of reinforcing structures to be elimated, allowing more useable interior space. Despite the high cost of this metal, the M113 became the first aluminum armored fighting vehicle to be produced in series. Unfortunately, as the welded armored plating used on the M113 has a maximum thickness of 35mm, it can only serve as protection against shell splinters and small calibre projectiles.

When the T117 concept was abandoned, design work continued on the T113 resulting in the T113E1 which went into series production in 1960. the first deliveries were made by FMC the following year, less than four years after the placing of the initial US Army order. Development work continued and in 1962 a further prototype, the T113E2, formed the basis of a diesel-powered vehicle which came off the production line in 1964 under the designation M113A1.

The basic M113 is powered by a 209 hp Chrysler 75M petrol engine. From 1964 onwards, the M113 was superseded by the new M113A1, fitted with a General Motors 215 hp diesel motor giving improved performance.

All the transmission components on the M113A1 are arranged within the engine compartment located at the front right-hand side of the vehicle. The power unit, with water and forced draft cooling, comprises the motor, torque converter, differential, cardan joints and gearbox. The three-speed gearbox and two-stage converter provide six forward and one reverse gears. A carbon foam extinguisher mounted in the engine compartment provides protection against overheating or fire. Two generator-charged 12 V batteries connected in series and located in the rear right side of the vehicle provide electrical power. The fuel tank is installed on the rear left-hand side.

As well as the driver and commander, the M113 can carry 11 men plus driver or 6.54 m^3 of equipment. Seated at the front left-hand side of the M113, the driver has an excellent field of vision through four periscopes installed in a cupola which can be supplied with an infra-red periscope system for night operations. The commander situated in the central part of the vehicle has a fully rotating cupola equipped with five periscopes and is seated between two rows of five infantrymen who, when required, can

rapidly leave the vehicle using the hydraulically operated ramp located at the rear of the vehicle. An emergency exit is provided in the ramp as well as several hatches in the upper part of the hull.

The torsion bar suspension system of the M113 with its absence of top rollers also offers definite advantages from the weight aspect. Ten oscillating arms each linked to a separate torsion bar, in conjunction with ten pairs of large rubber-rimmed road wheels (five a side) ensure optimum road holding capability. Hydraulic shock absorbers reinforce the front and rear oscillating arms.

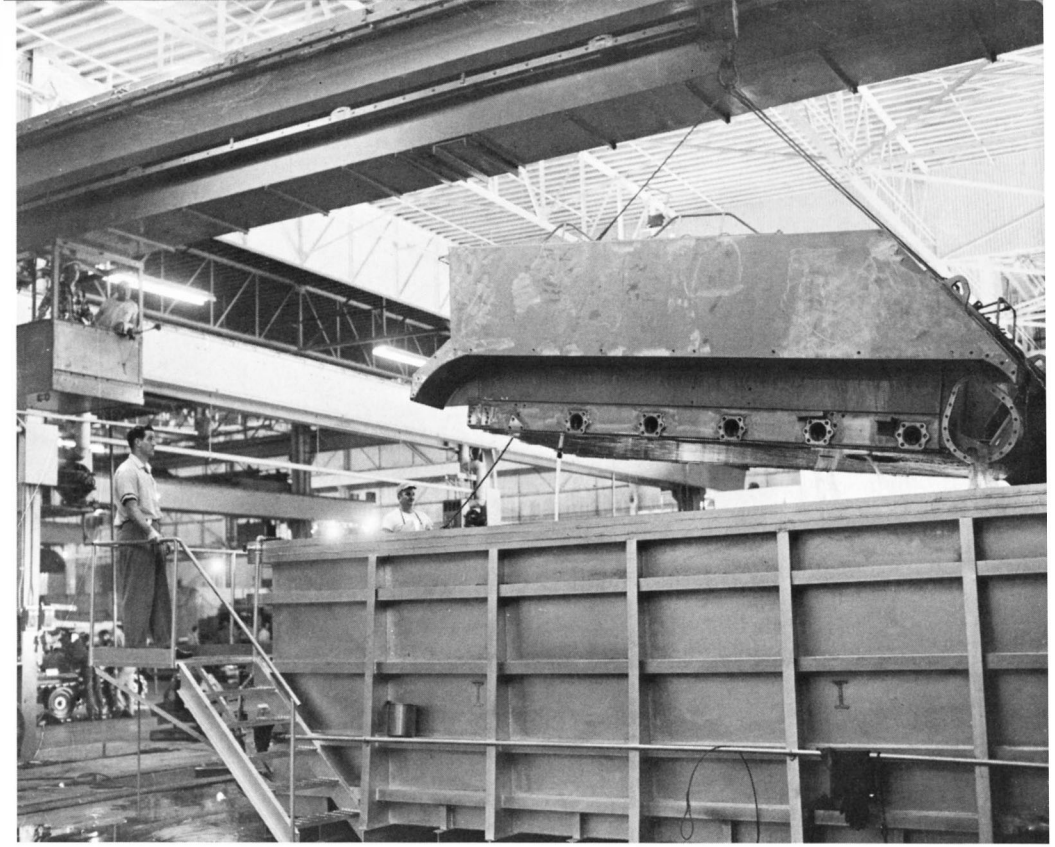
The tracks consisting of 63 and 64 track links on the left and right hand sides respectively are driven from the engine by means of drive sprockets. The track links of simple swivel type, housed in rubber bushings, ensure maximum track elasticity. Each link is provided with a rubber pad which as well as giving improved road holding assists in reducing the overall noise level. The track life on the M113 is about 4,500km but can extend to 14,000km. Track tension is regulated by mean of a hydraulic adjuster acting on the rear idler.

The M113's armament consists solely of a Browning M-2HB 12.7mm MG operated by the commander. His two-fold task of directing the crew while at the same time acting as gunner is aggravated by the insufficient protection afforded by the hatch which when locked in the open position only protects from the rear. A further disadvantage is that use of the externally mounted machine gun is ruled out in contaminated areas. The 12.7mm, aircooled MG can be rotated through 360° with the possibility of ground operation when mounted on a portable tripod housed in the upper part of the vehicle. Ammunition in portable boxes is stowed behind the infantrymen's seats.

An outstanding feature of the M113 is its ability to be operated in water without prior preparation, a characteristic of very few MICVs or APCs at the present juncture. The M113 hull construction is completely watertight. All critical points such as hatches, doors and ramp are fitted with rubber seals. The front of the vehicle is fitted with a hinged breakwater plate which maintains correct balance of the vehicle when it tends to move into a nose-down position. The M113 tracks are provided with rubber blades which ensure propulsion when amphibious operation becomes necessary. Two electric pumps having a combined capacity of 166 1/min keep the interior of the vehicle free from any water which may be shipped by the M113. Supplementary braking is available for controlling the tracks and to ensure improved mobility in such environment.

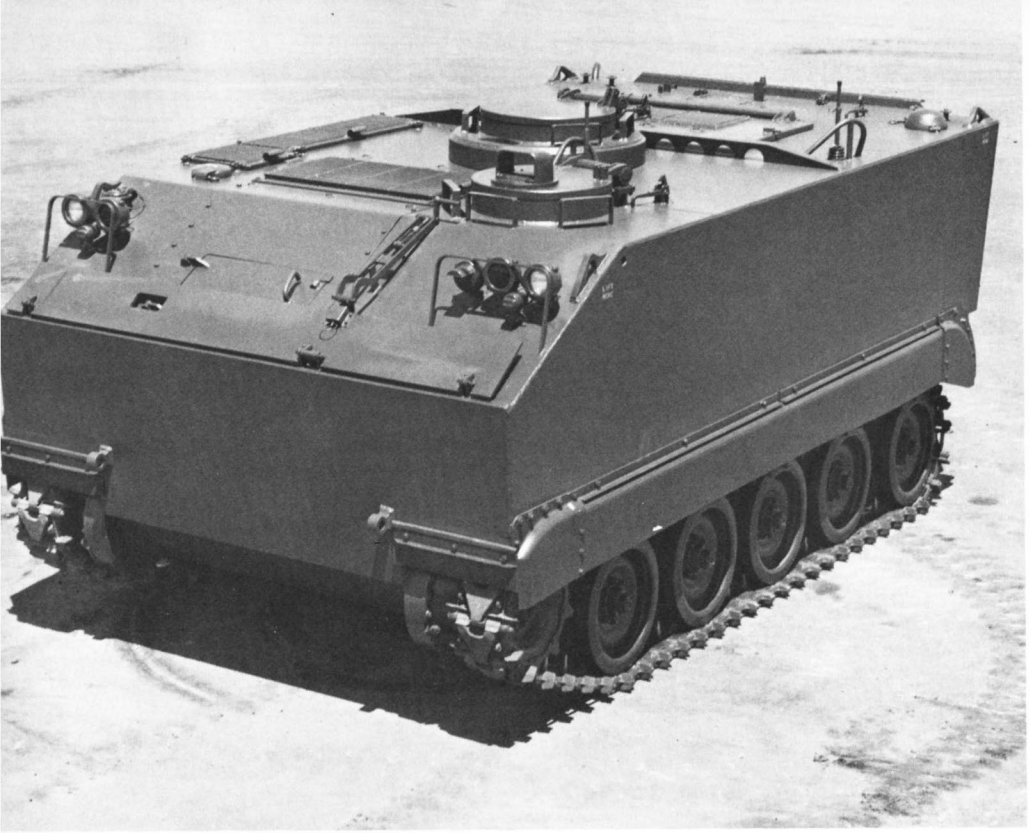
Since 1960, the M113 has been mass produced by the FMC Corporation of San Jose, California, temporarily at Charleston, West Virginia and under licence by SpA OTO Melara of La Spezia in Italy. Apart from those in service with the US Army, the M113 has been adopted by nearly forty countries. These impressive export figures result from three decisive factors; basic design offering full scope for specialized tasks, rapid deliveries, and low cost. In the face of escalating military budgets and the need for economic purchasing policies, an overall production run now topping the 50,000 mark has enabled the M113 to remain probably the best value-for-money vehicle available to military procurement agencies.

Besides being the most widely used Armoured Fighting Vehicle in the Western World, the M113 has considerably influenced the development of Armoured Personnel Carriers including the British FV 432, the Swedish Pbv 302 and the Japanese SU 60.



Basic hull being transported by overhead gantry to the next stage of the production line after having been dipped in a liquid bath. [FMC Corporation]

M113 production line at FMC Corporation's plant in San Jose, California. Major external fittings can be seen, but powerplant and other miscellaneous equipment have not yet been installed. [FMC Corporation]

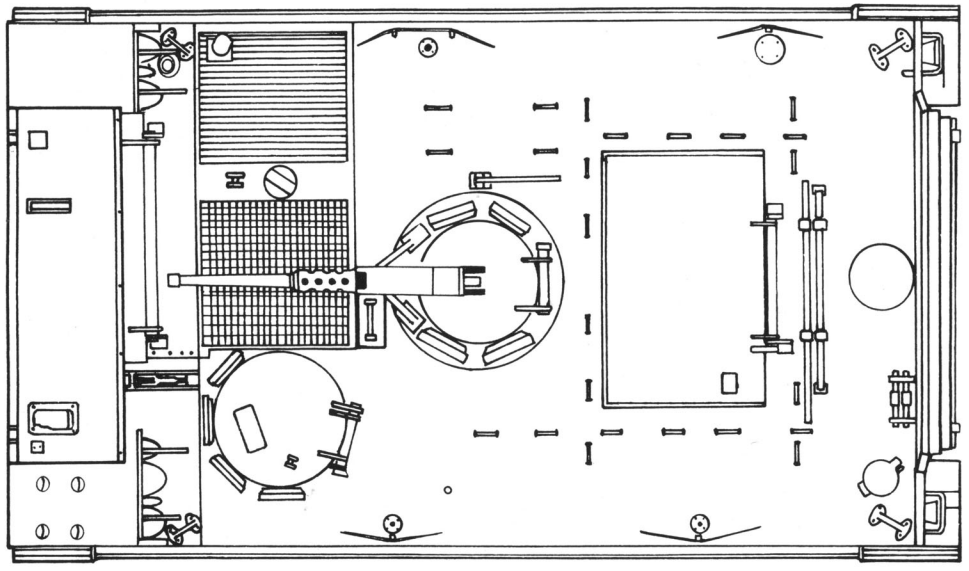


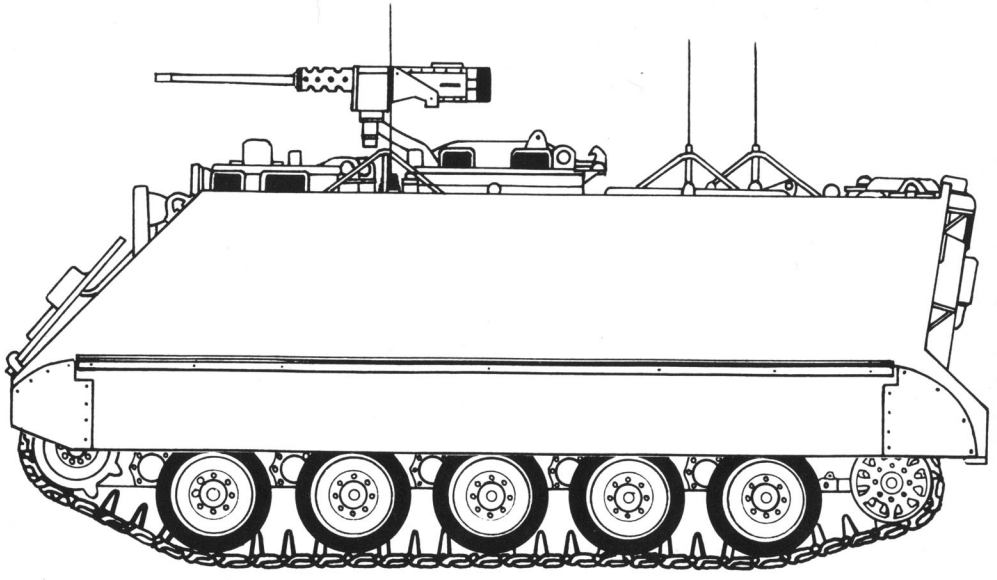
The T117 was manufactured of steel to determine whether this model or the aluminum T113 would be selected for production. Distinguishing features as on the T113 are the combination fifth road wheel-trailing idler, gasoline engine and vertical front. [FMC Corporation]

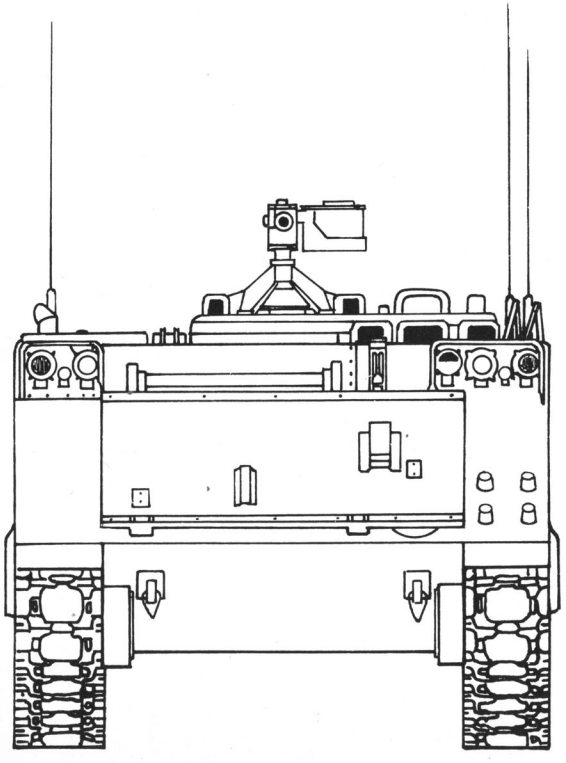
[Above Right] Third pilot model T113 during tests at Fort Benning. The T113 and T117 were both built to Us Army specifications, but development of the steel T117 was discontinued. The aluminum T113 gave rise in turn to the T113E1, standardized as the M113. [US Army]

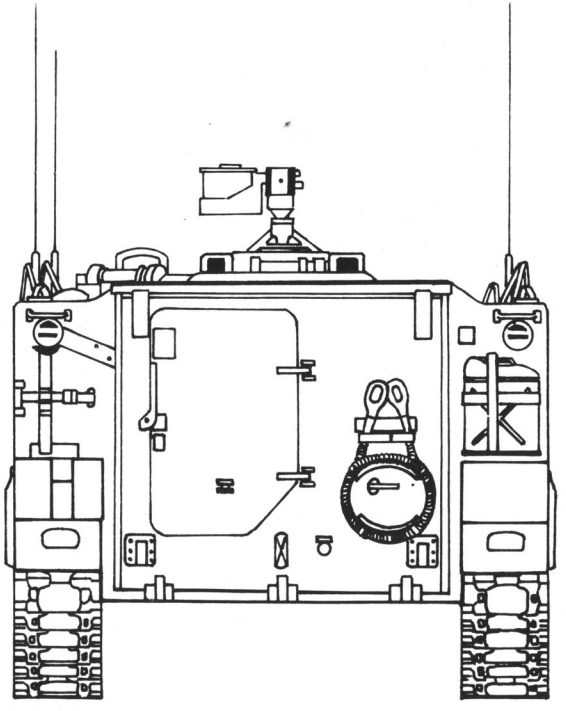
The T113E2, visually similar to the T113E1, differing only in installation of a diesel engine, was standardized from 1964 onwards as the M113A1. Note natural aluminum finish of vehicle. The most obvious differences from the original prototype are the redesigned, fully sloped hull front and the addition of a separate non-trailing idler. [US Army]

M113 A1









Specifications

HEIGHT	8 ft. 2½ in.
WIDTH	8 ft. 9¾ in.
LENGTH	15 ft. 11½ in.
CREW	1
Troops	12
WEIGHT	
Combat - Loaded	24,594 lb. (11,156 kg)
Net	21,383 lb. (9,702 kg)
Air-Drop	19,373 lb. (8,788 kg)
GROUND PRESSURE	
Combat Weight	7.81 psi (0,549 kg/cm^2)
ARMAMENT	Cal. 50 Machine Gun
AMMUNITION	2000 rds Cal. 50
CAPACITY	95 gal. (360 l)
SPEED, Land Level Road	42 mph (67.59 km/h)
Water	3.6 mph (5.8 km/h)
GRADEABILITY	
Forward slope	60%
Side slope	30%
VERTICAL-OBSTACLE	2 ft. (0.61 m)
TRENCH-CROSSING	5½ ft. (1.68 m)
TURNING CIRCLE	28 ft. (8.53 m)
CRUISING RANGE	300 mi. (483 km)

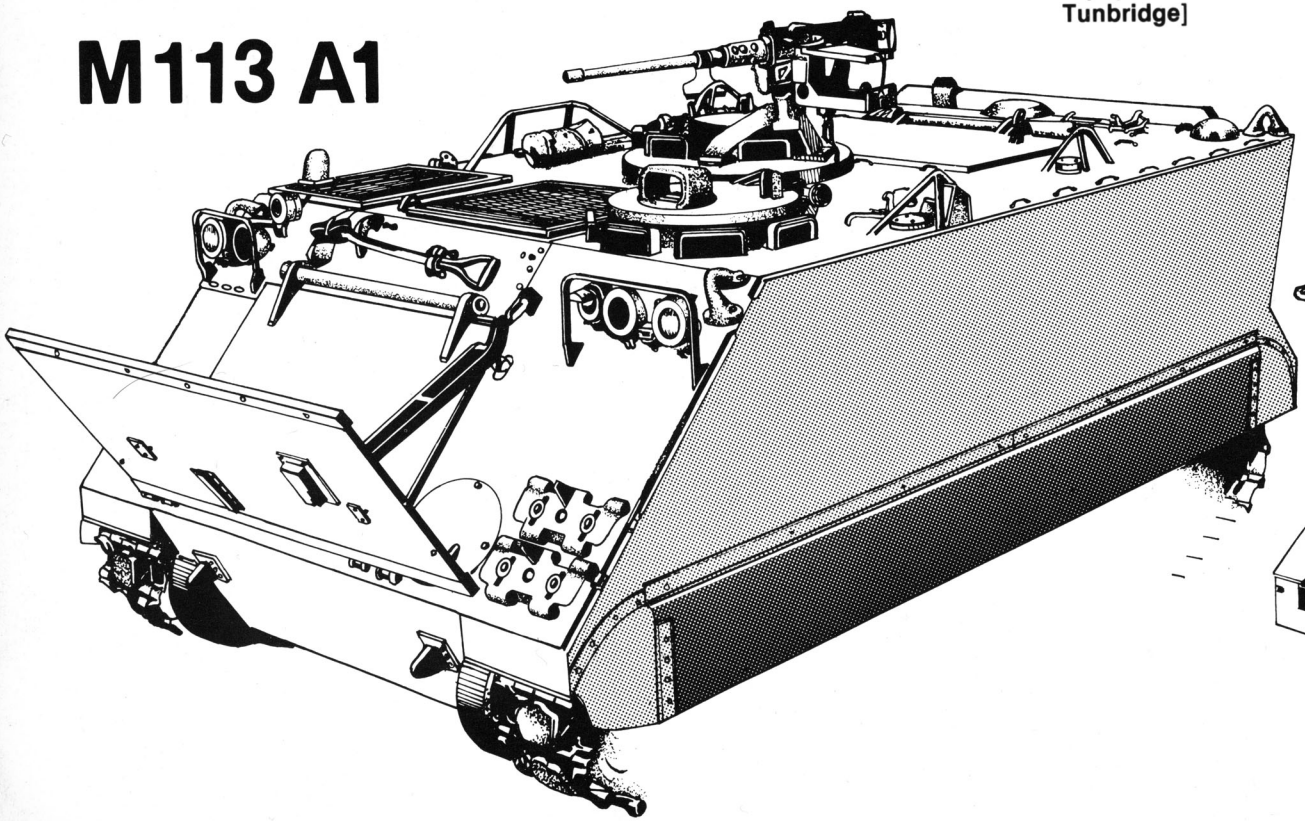
Four shots of standard M113A1s in US service in West Germany, 1976. All are vehicles of the 7th Army and carry the new US four-color camouflage and black markings, though the unit designations have been stenciled in white. All carry the "as built" armament of a single .50 cal. MG, and for some reason are almost completely bare of external tool stowage. [Pierre Touzin]

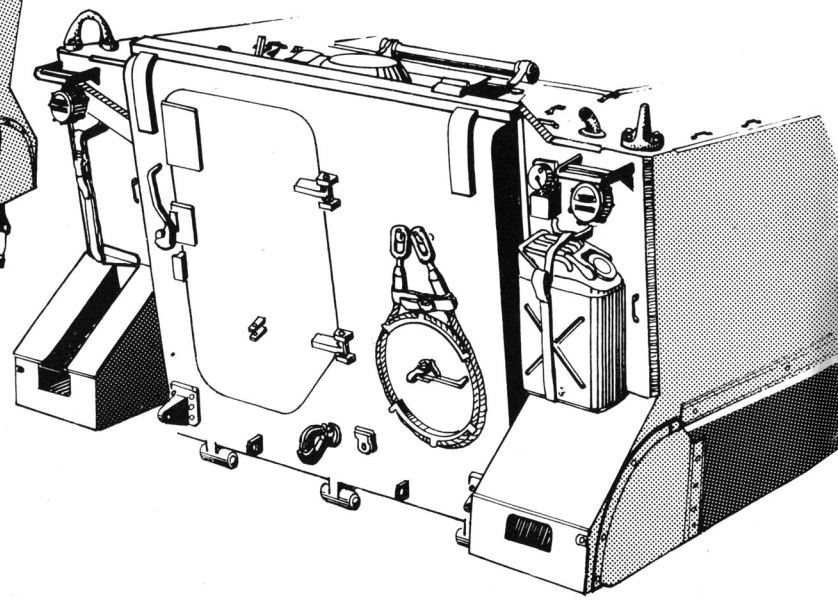
Canadian platoon advancing under cover of a M113. A camouflage tarp is caught under the trim vane. This is a standard vehicle except that the rubber sideskirts have been removed. Visible markings include the tac sign "31C" on the hull side and a Canadian flag insignia and license plate on the front. [Canadian Army]

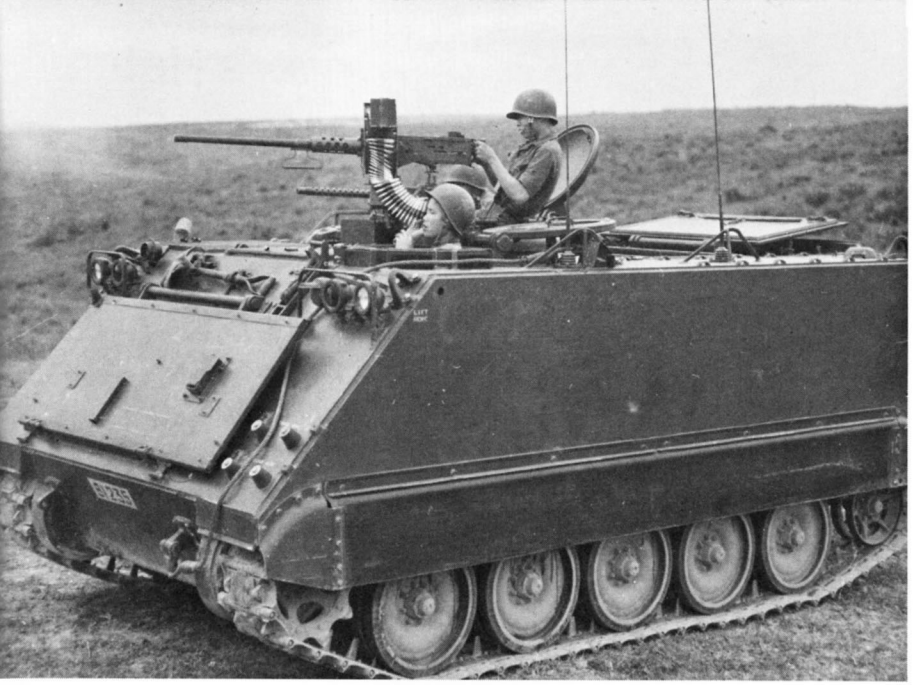
[Left Above & Below] Danish M113 awaiting orders. Standard registration plates are fitted on front right, and rear left mud-guards as well as on hull sides. The vehicle front is draped with camouflage netting. Except for the addition of a rear-view mirror, it is in absolutely standard condition. [Stephen Tunbridge]

Switzerland was one of the first foreign countries to adopt the M113 calling it the Schutzenpanzer 63. [Left] A standard M113 is seen passing in front of a Centurion, both with skirts removed to aid in the clearing of mud, preventing track damage. [Above] A clear shot of top deck of Swiss M-113. Equipment is absolutely standard. Note cargo hatch door open. [Stephen Tunbridge]

M113 A1







ARVN troops firing from an M113 during early part of Vietnam conflict. Notice how the commander's hatch is blocked in a 90° position giving rear protection. Additional firepower is supplied by an unprotected soldier lying on the top deck, manning a 7.62mm MG. Note the spare track links missing from their stowage position on the hull front. [US Army]

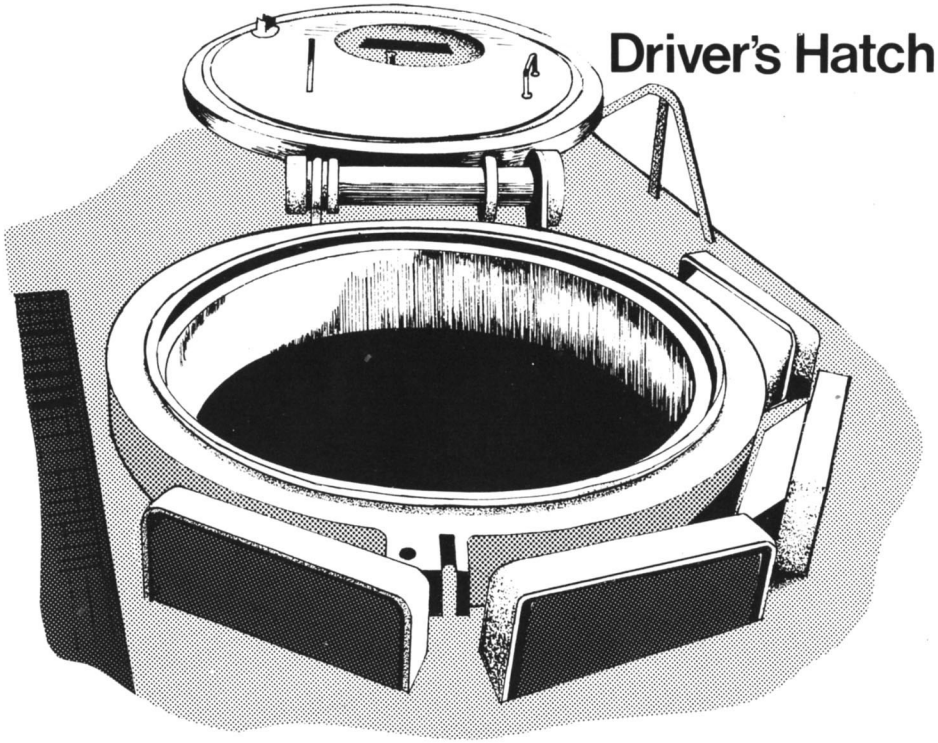
[Right] The same vehicle as above, seen from the rear, showing ARVN troops of 4th AC on exercises, immediately after they received their first M-113s, March 20, 1963. It was appreciated very quickly that the single 12.7mm MG was inadequate for suppressive fire to cover the squad's dispersal. An expediant, if somewhat dangerous, solution was the addition of the exposed 7.62mm MG. [US Army]

ARVN M113 plunging into a river at full speed. This vehicle was one of the first to be sent to Vietnam. Note US aid shield on the hull side. [US Army]

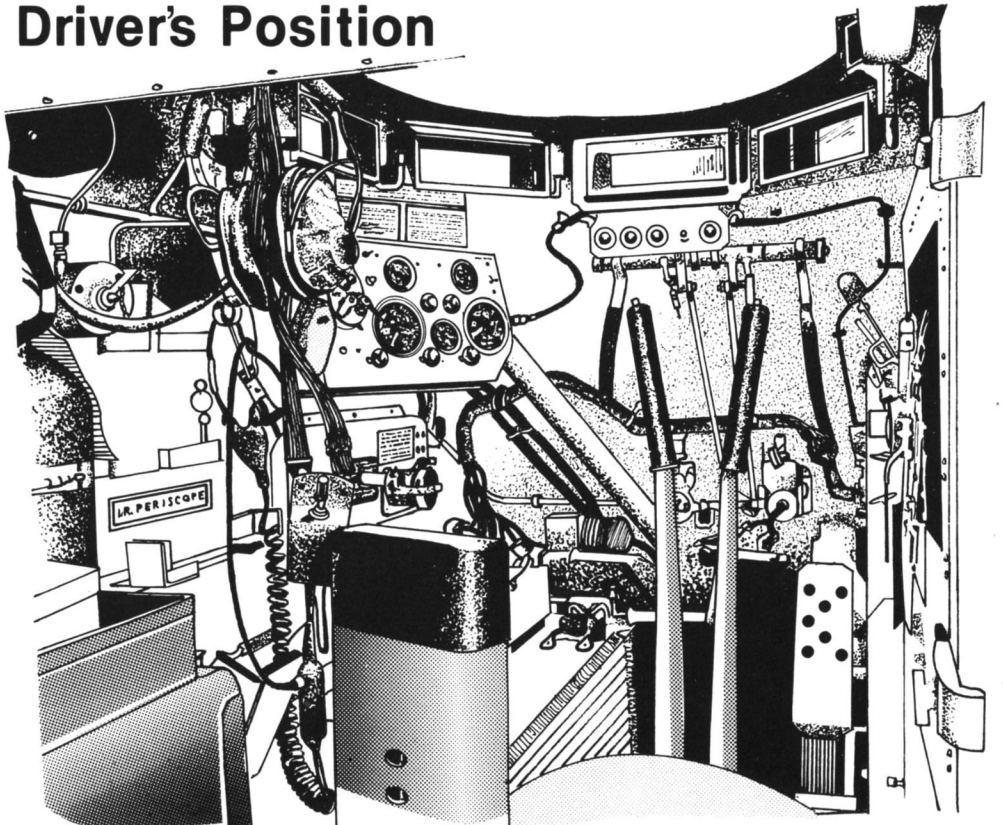
German M113G with temporary stick-on maneuver markings. Most M113s in service with the Bundeswehr are equipped with 8 smoke dischargers and German weapons. [Bundesministerium de Verteidigung].

West German M113G FuF equipped with additional radio installations. Because this is a radio vehicle, it lacks the smoke dischargers. In the place of the US 12.7mm MG, the Germans have mounted their own Mauser-made 7.62mm MG 3.

Driver's Hatch



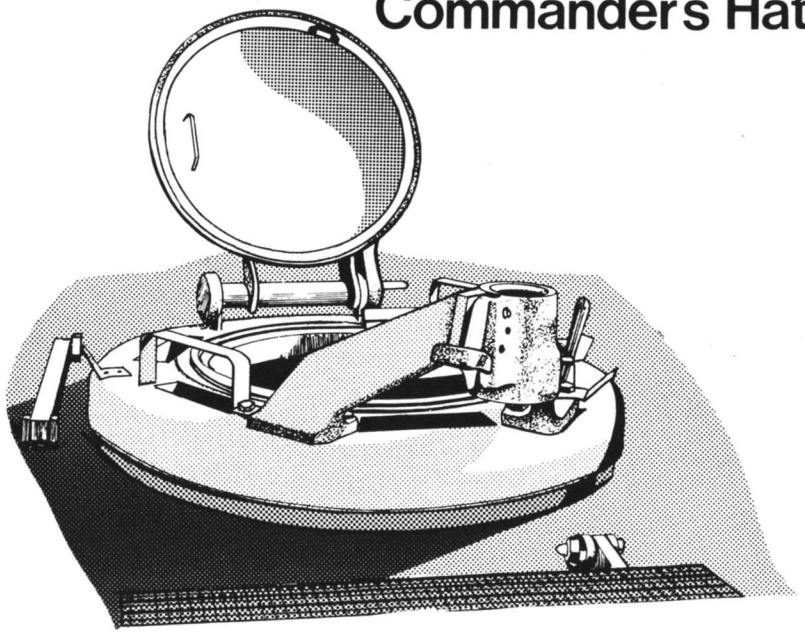
Driver's Position



Israeli M113J escorted by M48 Pattons. Israeli M113Js are fitted with side stowage racks and grab rails and exhaust pipe extensions to prevent intake of exhaust gases. The stowage racks look very much like they were styled after those of the M3 Halftrack, still in Israeli use. These Js can be made with the highly advantageous exhaust extension and without the front trimvane because the Israelis do not anticipate using them in an amphibious role. [Israeli Defense Forces]

The crew is seen disembarking from an Israeli M113J prior to taking up combat posts. Note the variety of stowage behind the grab rail. For some reason the Army ID number has been repeated on the vehicle side. The tac sign looks like it was applied hastily.

Commander's Hatch



[Above Right] Israeli M113J leaving the battle area with fabric identification markings displayed on hull side, repeating the painted on markings. Of interest are the oversize night glasses mounted on the top deck. [Israeli Defense Forces]

Israeli M113Js in action with gunners manning U.S. 12.7mm and 7.62mm FN machine guns. There is a mount for a second FN on the other side of the top deck on the foreground vehicle. Both have their tac signs on cloth panels. While neither vehicle has the trim vane, the one in the foreground has the vane actuating mechanism.

M113 Modified

Despite considerable success, the basic M113 design has not always proved adequate. The designers were obliged to meet the US Army requirements for infantrymen to be transported to the operational area where, after dismounting from the APC, troops would complete their tactical mission on foot. This battle-taxi concept meant that the M113 design did not take into account the vital need for troops inside to be able to observe the military scenario in the combat zone. The result has been that infantryment have experienced difficulty in forming a rapid appreciation of the situation on leaving the vehicle, often under enemy fire.

Unless troops expose themselves through the hatches they are unable to make effective use of their weapons, while defensive action is limited to manning the externally mounted machine gun with consequent risk to the commander who is obliged to expose himself to enemy fire. In any event, M113 design is such that while acting as 'machine gunner', the commander, located in his central cupola, cannot discharge his primary function as tactical leader. The mounting of the 12.7 mm MG is also called into question when this is comparatively ineffective against moderately armored targets.

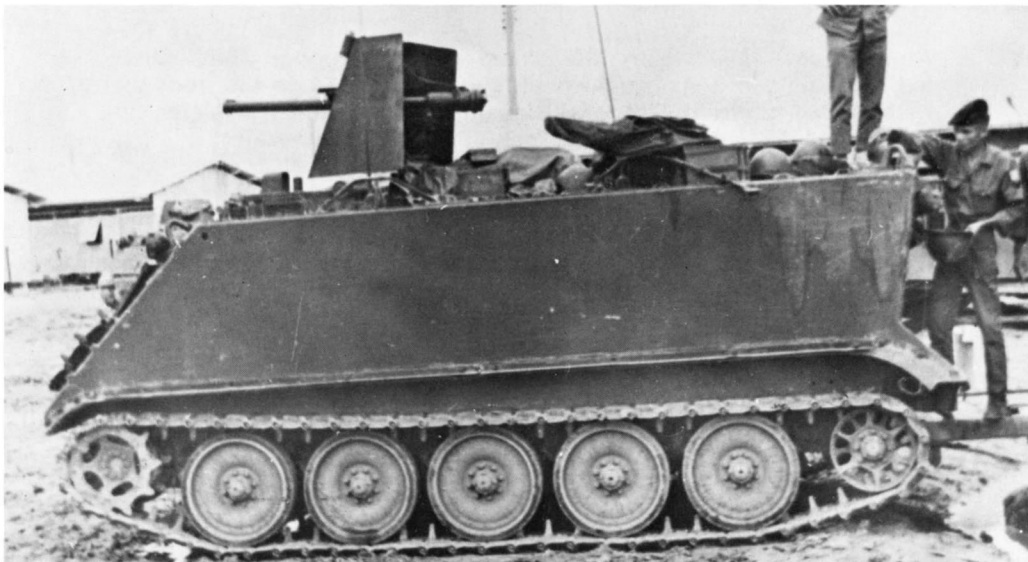
These weaknesses in design first became apparent in 1962 when two companies each consisting of fifteen M113s were operated in the Mekong Delta in Vietnam. Despite the rice paddies and irrigation canals, the M113s experienced little difficulty in covering soft terrain when called upon to leave the roads. In addition to transporting riflemen to operational zones they were also deployed in close co-operation with tanks. Their employment in this role, which went considerably beyond the original US Army requirements, served to demonstrate their inadequate firepower and protection. They could provide fire support with the main MG only at considerable risk to the commander, and any weapons carried by the crew could only be brought to bear by leaving the vehicle.

In 1965, therefore, it was decided to convert the M113 Armoured Personnel Carrier (APC) in Vietnam into an Armored Cavalry Assault Vehicle (ACAV) by the incorporation of side-mounted machine guns and gun shields. The latter, however, could only serve as palliatives in the absence of a conventional turret.

As far as the US Army was concerned, no turrets were introduced on a large scale in Vietnam although numbers of different turrets and cupolas have been offered commercially both in the United States and Europe. In fact, most armies equipped with the M113 are now considering the installation of turrets as may be seen in various photographs in this book. The embodiment of a turret to the basic design has frequently resulted in upgunning the original 12.7 mm or 7.62 mm MG to a 20, 25 or 30 mm automatic gun. Provision of this heavier weapon is in line with the requirement that APCs should be capable of engaging enemy APCs and similar vehicles as well as offering effective anti-aircraft defense capacity.

Taking part in Operation "Silver Springs" in January 1967, this 1st Infantry Division M113 shows the first stage of modification. A jury rigged shield has been welded on either side of the standard 12.7mm MG mount. The gun itself sports a rather exotic looking flash hider. [US Army]

A modified ARVN M113 with armor protected 57mm recoilless gun as used by support platoons in South Vietnam. [James W. Loop via Robert J. Icks]



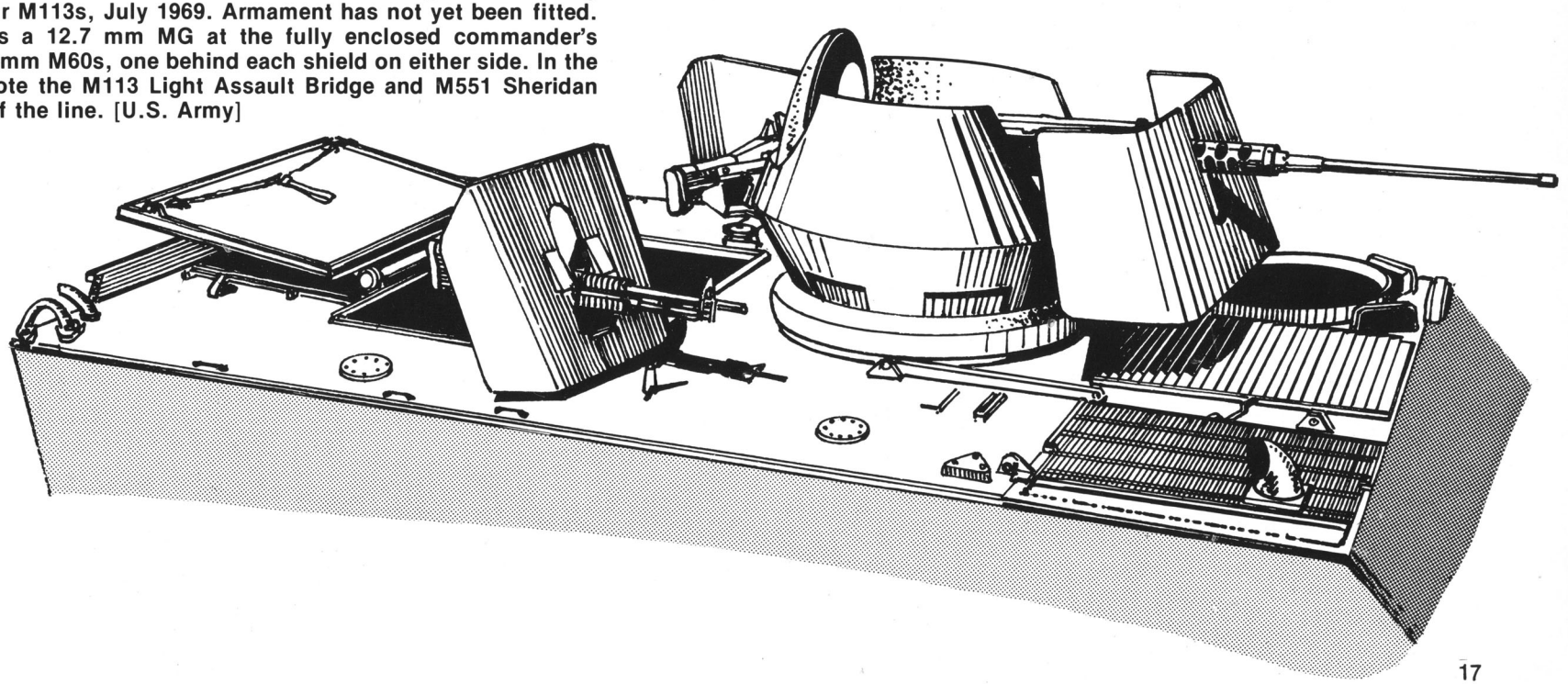
An Australian M113 with MG shield crashes through thick bush, South Vietnam. An additional road-wheel is usually carried on the front part of the hull as well as the rolled concertina wire. [Australian War Memorial]

[Above Right] An Australian M113 modified with a differently shaped MG shield, South Vietnam. The protective screens lessen the effect of enemy hollow-charge rockets by detonating the missiles before they reach the carrier. The sandbags on front hull and the earth embankment provide additional protection for this vehicle. [Australian War Memorial]

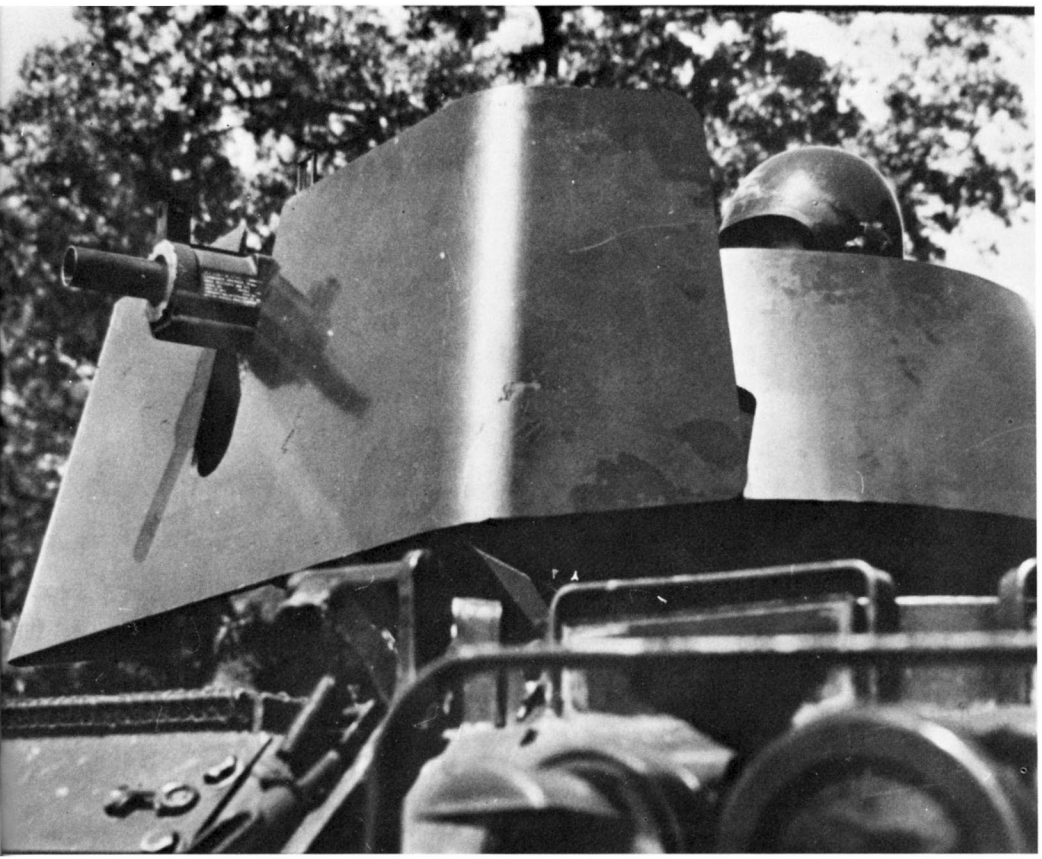
A dusty column of modified Australian M113, seen at Bien Hoa, South Vietnam. [Australian War Memorial]

Two views of the U.S. Army ACAVs in Vietnam. In the photo above, troop "B" of the 17th Cavalry, 82nd Airborne Division is seen immediately after receiving the ACAV kits for their M113s, July 1969. Armament has not yet been fitted. Standard arms fit was a 12.7 mm MG at the fully enclosed commander's division, and two 7.62 mm M60s, one behind each shield on either side. In the photo on the right, note the M113 Light Assault Bridge and M551 Sheridan bringing up the rear of the line. [U.S. Army]

ACAV

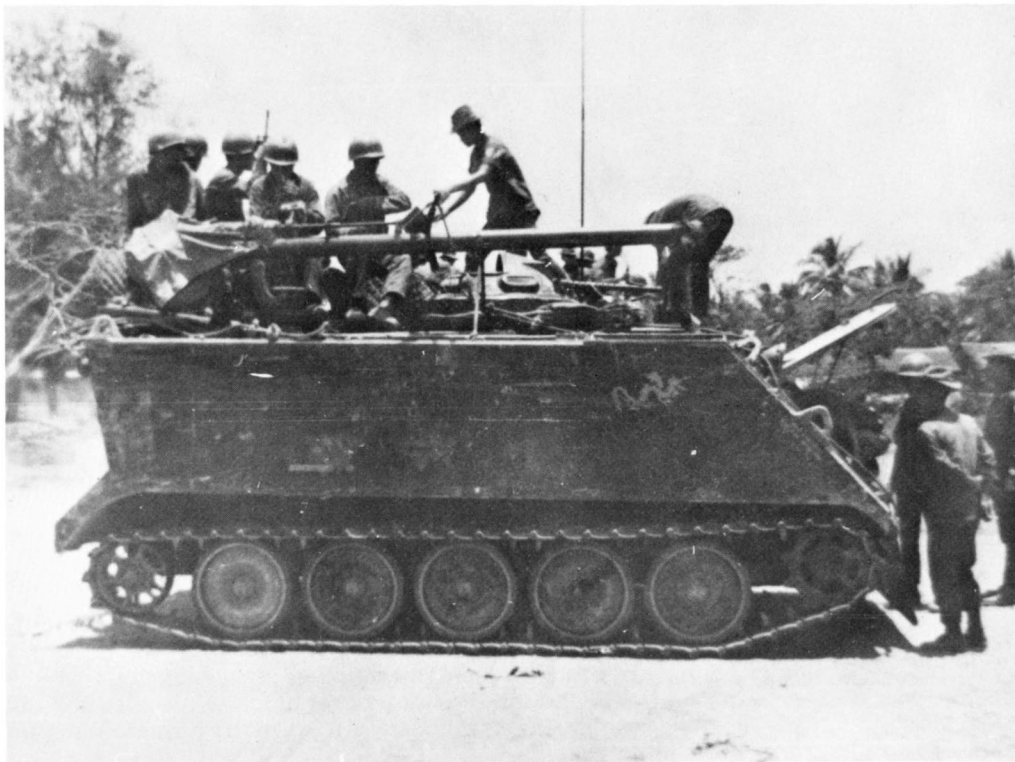


ACAVs of the 4th Cavalry, 25th Infantry Division, are seen on patrol, August 3, 1969. Note the variety of stowage, both official and unofficial; the rolled cyclone fencing, fence posts, spare road wheels, smoke grenades, tarps and more strewn liberally over the vehicles. [US Army]



M113 ACAV with Hughes Grenade Launcher. This was a common replacement for the commander's 12.7mm MG in M113s of support platoons. [Hughes Tool Company via Robert J. Icks]

[Above Right] M113 with searchlight and M24A2 Navy turret mounting twin .30 MGs here seen in use with the ARVN forces. The turret is identical to that fitted to current Amtracs. Note the .50 has been repositioned to the rear. [Ordnance Magazine via Robert J. Icks]



ARVN M113 with M24A2 Navy turret and 106mm anti-tank gun. [James W. Loop via Robert J. Icks]

Time for a quick brew for the crew members of an Australian M113 with Cadillac-Gage turret following a night ambush in Phuoc Thuy Province, South Vietnam. Note the string of smoke grenades across the rear of the turret. The commander is seated on the open turret hatch. Note also the .30 caliber MG in the foreground. The addition of a third pintle-mounted MG on the turret was a common practice.

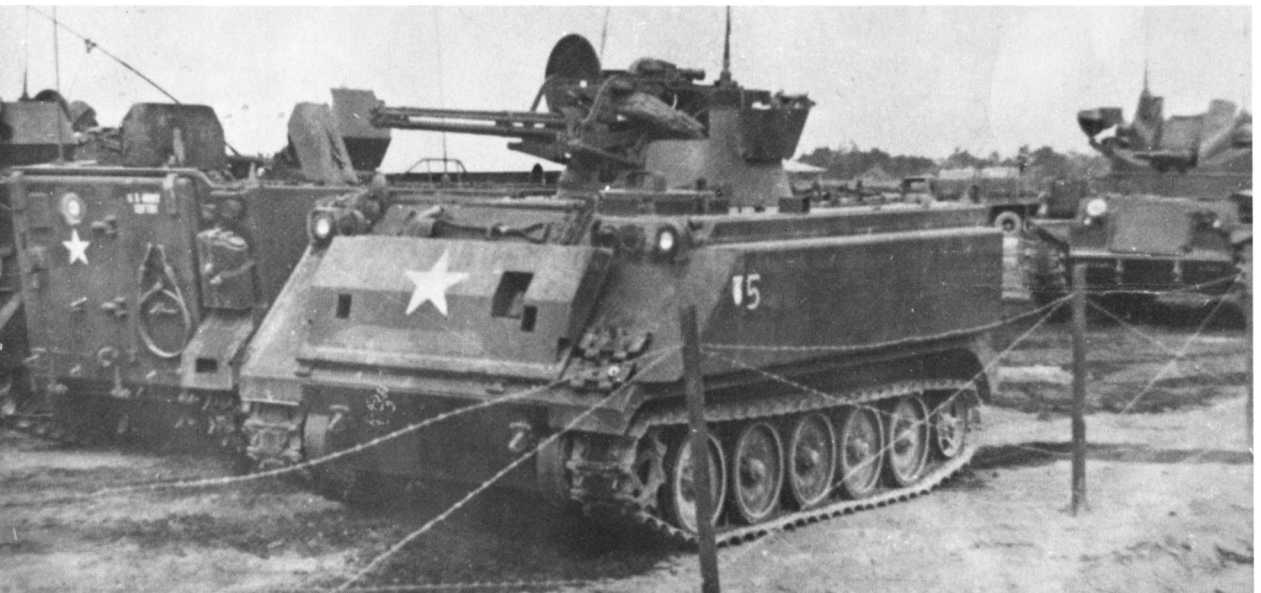
Australian M113A1 of "A" Squadron, 3rd Cavalry crossing a stream in South Vietnam during operation 'Capitol'. These carriers fitted with T50 Cadillac Gage turret and twin .30 MGs are used as Light Reconnaissance Vehicles. Note boxes of .30 caliber Ammo in the specially-made racks on the hull top. [Australian War Memorial]

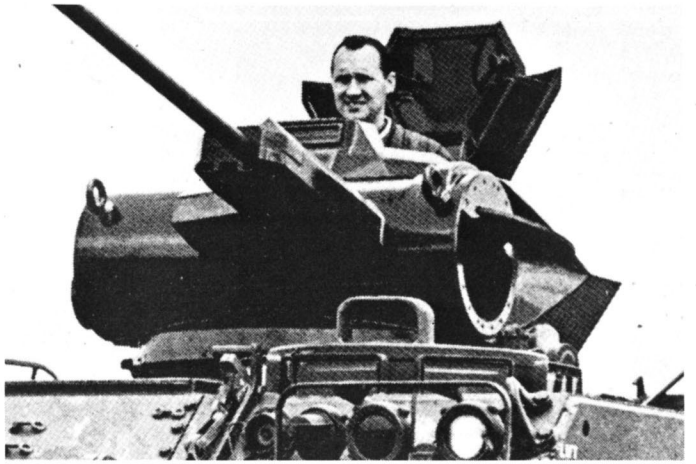
An Australian M113 fitted with the Cadillac-Gage turret surmounted by local popular forces troops, guiding the Aussies to suspected Viet Cong hideouts. Curiously, the turret has had one of its two .30s removed, and the hold blanked over, but retains the auxiliary MG on its pintle mount. Some dissatisifed soul has inscribed a peace sign in the dust on the turret's forward vision block. [Australian Army]

[Above & Right Above] Australian M113s fitted with the Saladin gun turret were extensively used in Vietnam as a fire support vehicle. The low velocity 76mm gun fired an extremely effective HE round. Both of these shots were taken during exercise "Irish Hussar" in August 1975. Note the blank adapter fitted to the muzzle of the .30 cal. coaxial MG in the photo above. [Australian Army]

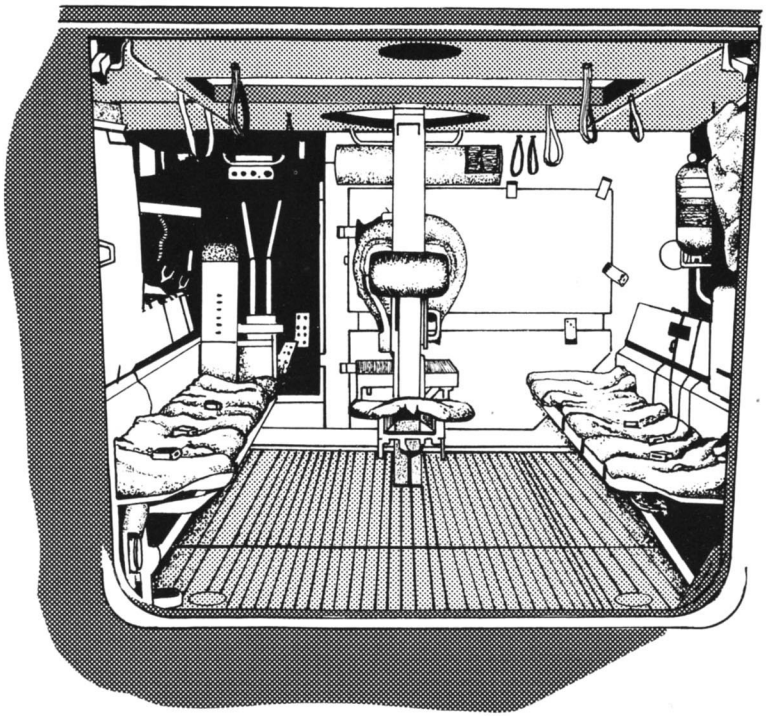
Prototype Fire Support Vehicle [FSV], now in the course of introduction for the Australian Army, combines the basic M113A1 with the British Scorpion 76mm gun turret and additional flotation panels. While the gun is the same as the Saladin's, the fire control and loading, as well as the ballistic shape of the turret, are all vastly improved. [Australian Army]

M163 Vulcan Air Defense System [VADS] with Vulcan 20mm guns mounted on M741 hull. The above vehicle is part of the US Army Blue Force units airlifted to Germany to participate in Reforger IV maneuvers. The one below is seen in depot in Vietnam surrounded by disarmed ACAVs and a lone M42 Duster. Note in particular the added flotation cells along the sides and on the trimvane and the small radar dish on the right side of the turret. While the M163 was designed for, and is extremely effective at, defense against low-flying aircraft, in Vietnam it was also found to be successful against ground targets. [James W. Loop via Robert J. Icks]

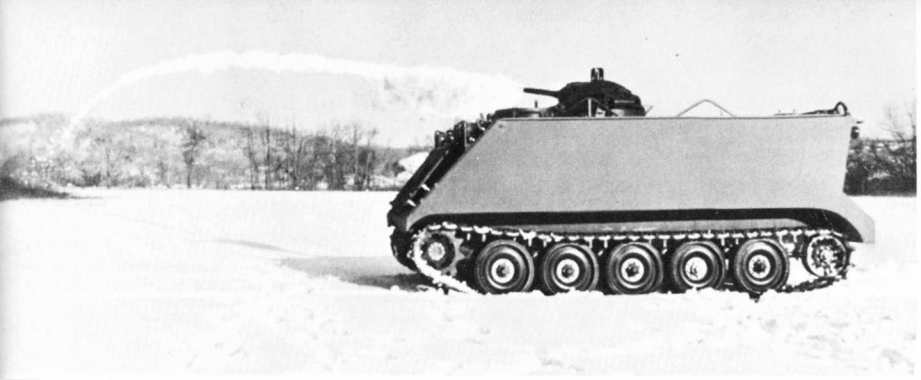




Experimental US Army M113 Integrated Command Station with 25mm stoner gun in a one man panoramic turret. [Robert J. Icks]



M113 Interior

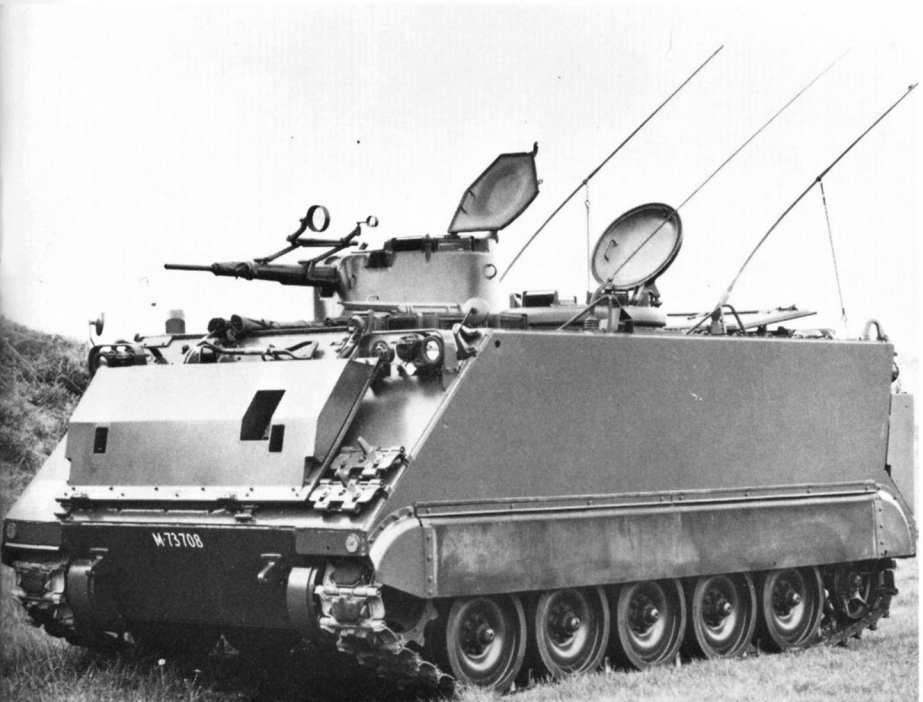


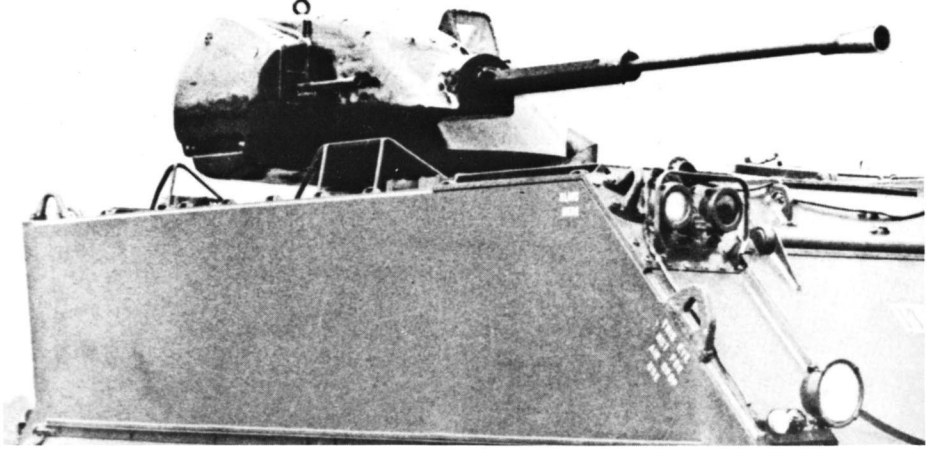
Seen in the snow, an M132 self-propelled flame-thrower vehicle with a cupola consisting of an M10-8 flame gun and an M73 7.62mm MG fires its main armament. [FMC Corporation]

[Above Right] A West German M113G equipped with Rheinmetall TS Rh 10 turret and Rheinmetall MK 20 Rh 202 20mm automatic gun is seen on the test range. [Rheinmetall GmbH]

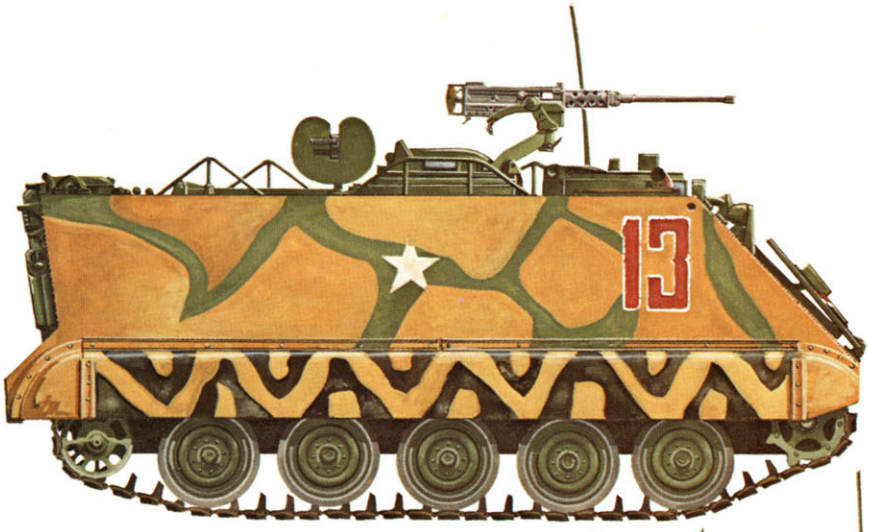
[Below Right] A West German M113G is seen experimentally equipped with a Rheinmetall turret and Hiopano-Suiza HS 820 20mm gun. [Rheinmetall GmbH]

On this Swiss Army Schutzenpanzer 63/73, an additional flotation panel is mounted on trim vane to compensate for the additional weight of the Swedish Hagglunds 20mm gun turret. The commander's cupola has been transferred to the right. [Swiss Army]

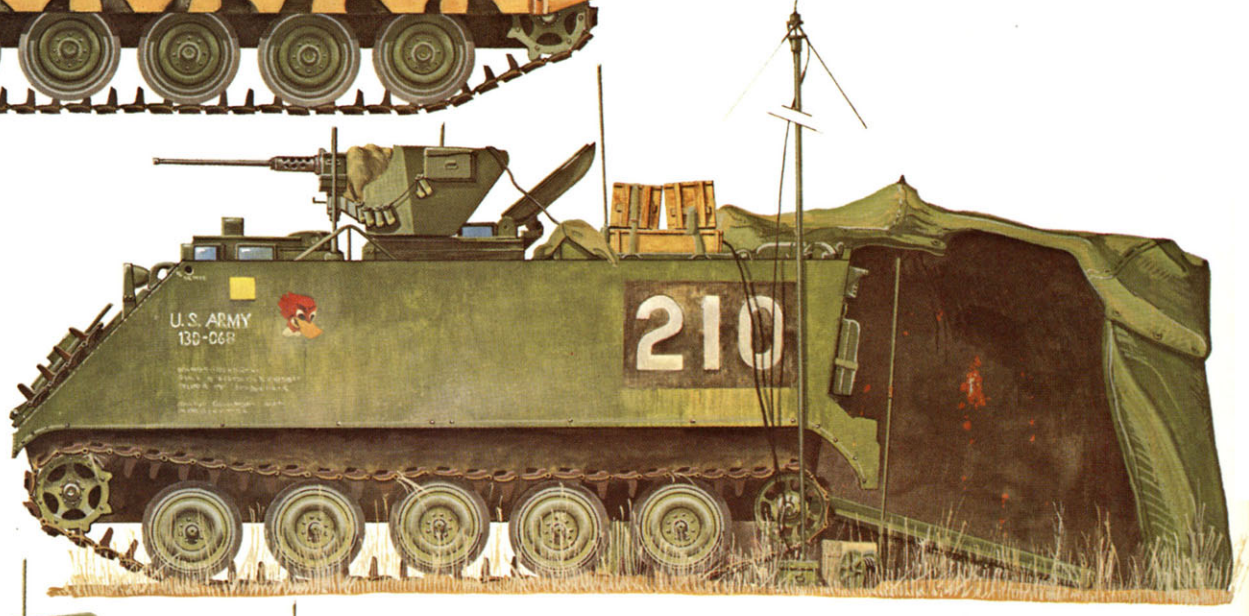




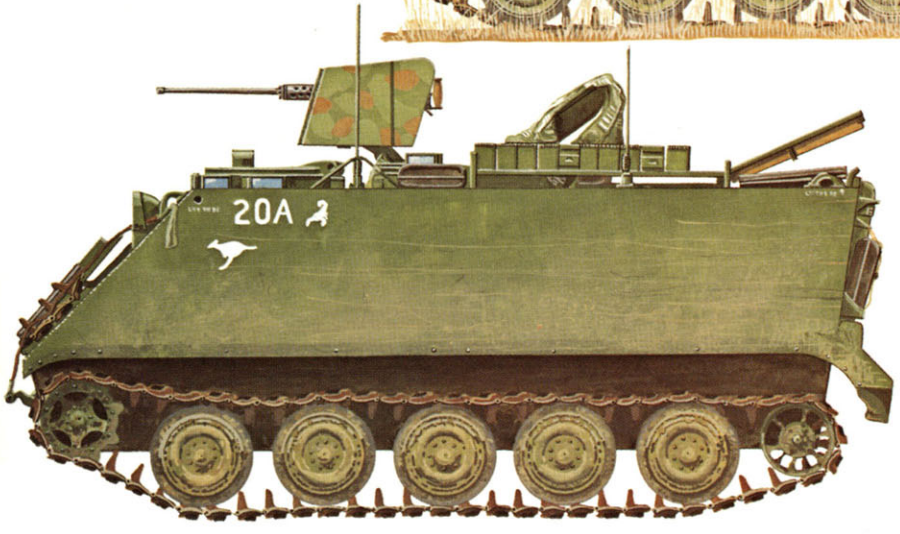
A series of experimental turrets that have been fitted to the basic M113 by four different countries are seen here. This is by no means the sum total of such experiments but merely a representative sample. [Left] A British experiment, the Peak one-man turret is seen here, fitted with the Rarden 30mm Cannon and a co-axial 7.62mm MG. [Robert J. Icks.] [Below Left] A Swiss Army Schutzenpanzer 63 is here experimentally fitted with a Mowag trunnion mounted Mauser 7.62mm MG3. This is the same mount used on the West German APC Marder. [Mowag Motorwagenfabrik AG] [Bottom Left] The US Army fitted this M113 with a triple mount of the Hispano-Suiza HS 820 20mm gun. [Robert J. Icks] [Below] The Italians have fitted this Oerlikon 25mm GBD-B20 Gun turret to one of their OTO-made M113s. [Oerlikon-Buhrle AG] [Bottom] Perhaps the most recent of the developments, this Swiss Schutzenpanzer 63 has been fitted with the new Mowag VO42 turret for a single .50 cal. MG and six smoke dischargers. [Mowag Motorwagenfabrik AG]



ARVN M113A1, Vietnam,

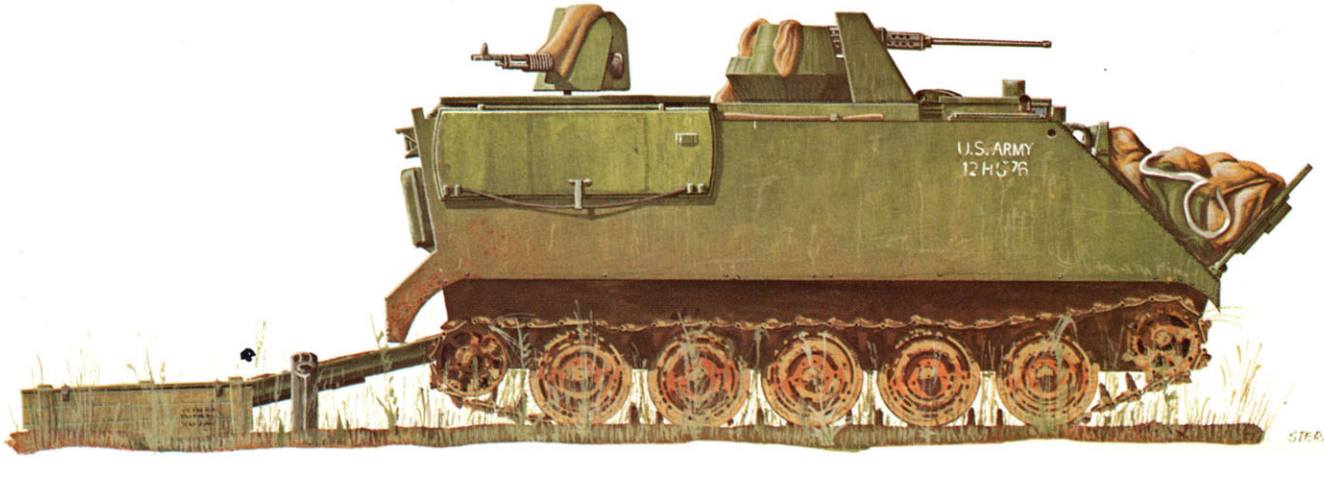


US M113MCP, 1st Infantry Division, Vietnam, 1968.

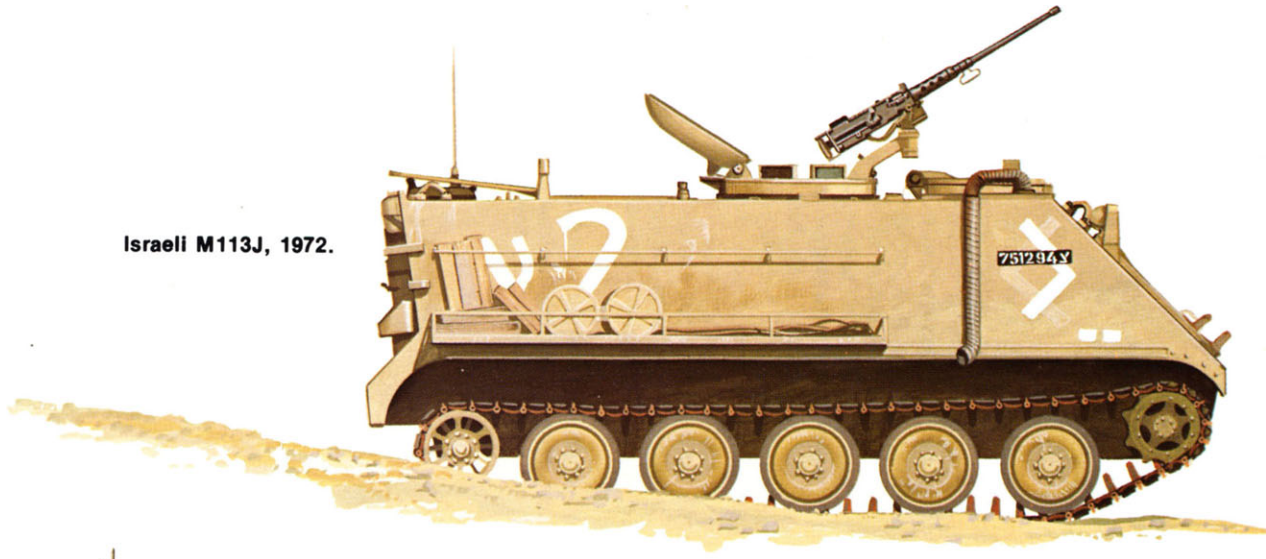


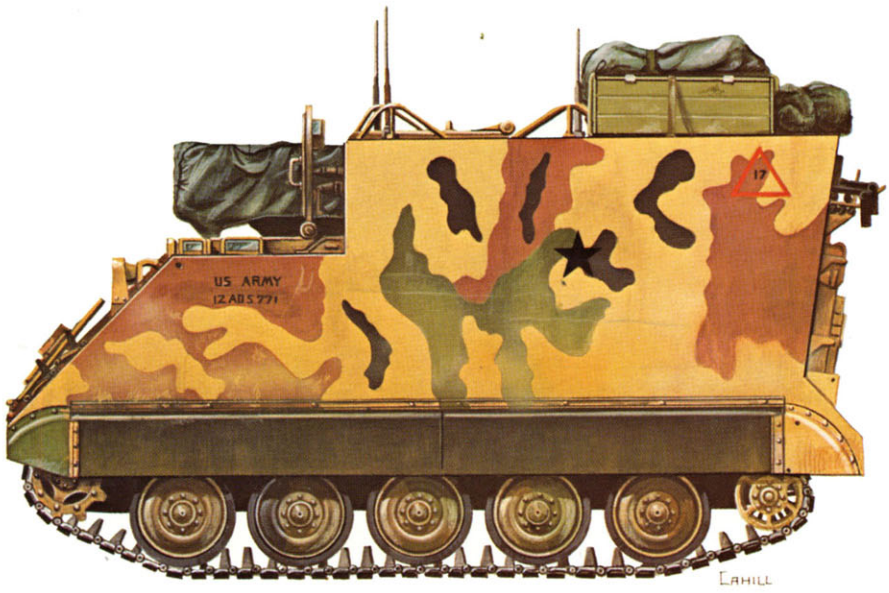
Australian M113A1 with shielded .50 MG, Vietnam.

US M106A1, 11th Armored Cavalry Regt. Vietnam, 1970.



Israeli M113J, 1972.





US M577, Germany, 1973.

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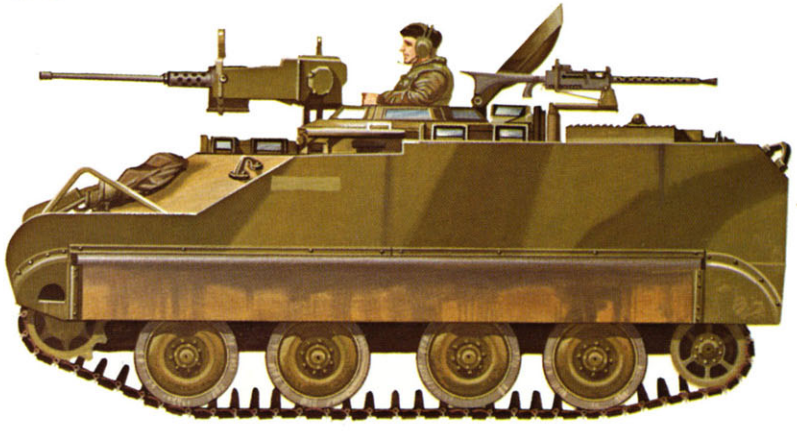
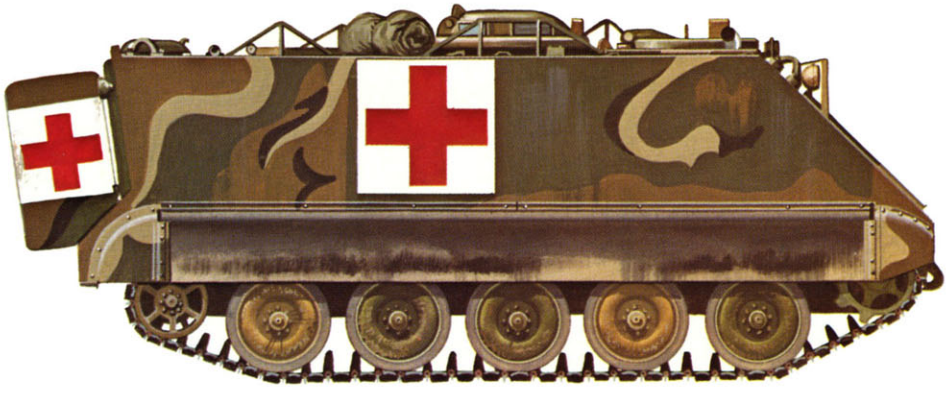
Canadian M113C&R





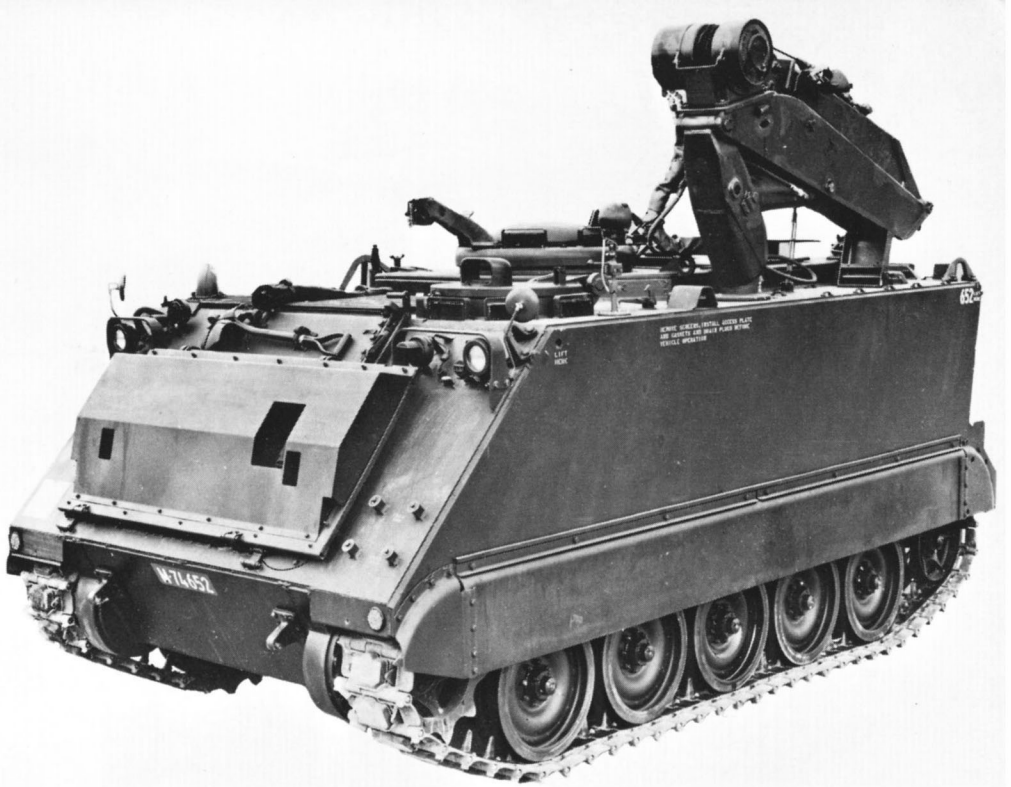
US M113A1, Germany, 1974.

M113 Variants

The basic M113 has given rise to a large number of variants, ranging from mortar and rocket carriers, to recovery and bridgelaying vehicles, to unarmored transporters and radar vehicles. Very few of these variants have actually been standardized, but as long as the M113 remains the most reliable and inexpensive tracked vehicle around, more are sure to appear for many years to come.

Of the estimated total of 150 variants, only the most important and the more recent are covered here. It is perhaps of interest to note that the M548 Transporter and M113 C+R, both variants of the basic M113, have themselves originated a series of variants. While only purely military applications have been examined in this book, there is also a very wide range of civil applications: basic M113 used by Swiss police on international airports for anti-terrorist security patrols; modified M113 used at Cape Kennedy as emergency vehicles; modified M113 used as tractors in Southeast Asia for towing agricultural equipment.

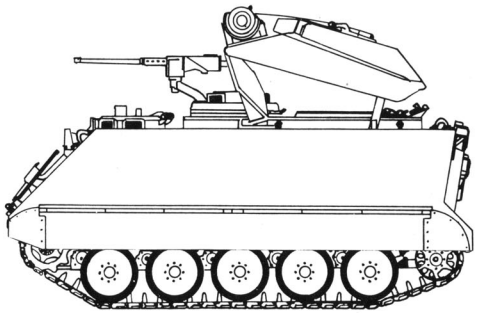
A Swiss Geniepanzer 63 [M113 with bulldozer kit] is seen passing through a town. This is a standard fit in most armies operating the M113, producting an instant Armored Engineers Vehicle. [Interpress]



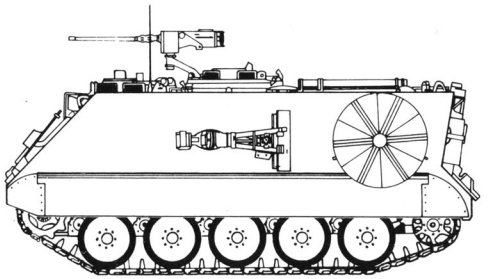
The M579 Fitters Vehicle here seen is Swiss service, is distinguished by the large hatch on hull top and hydraulic crane capable of lifting complete power units if required. The additional flotation panel on trim vane helps compensate for weight of hydraulic crane. [Swiss Army]

Swiss Army M579 Fitters Vehicle with extended crane jib is seen hoisting an M548's power unit while an M113 track undergoes repair in foreground. [E.C.P.-ARMEES]

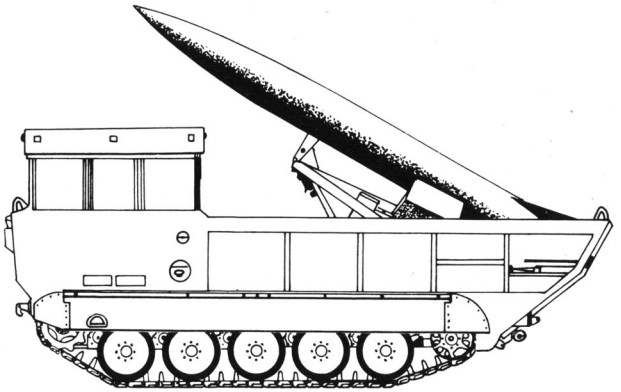
M113 Variants



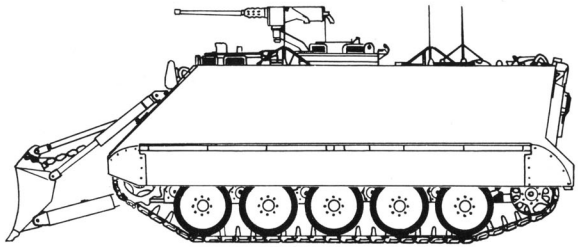
M579 Fitter's Vehicle



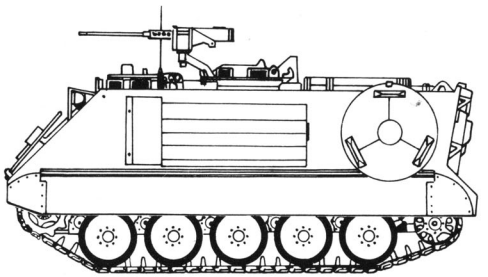
M106



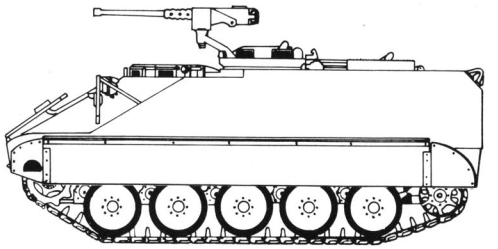
M669 Lance



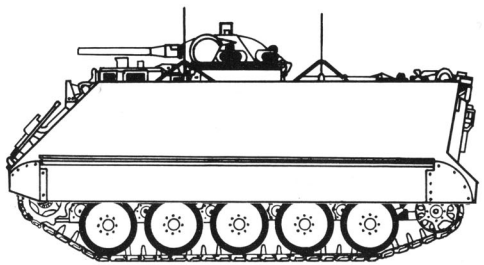
M113 Bulldozer



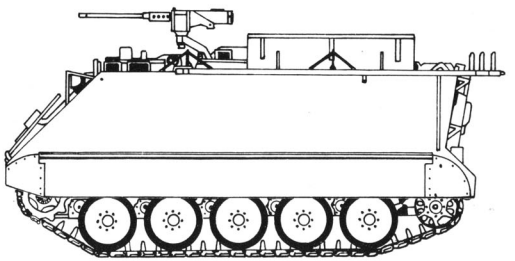
Swiss 120mm



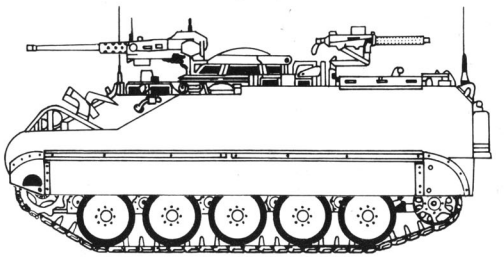
M113 C & R



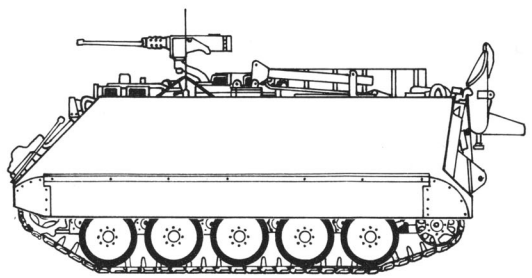
M132 Flamethrower



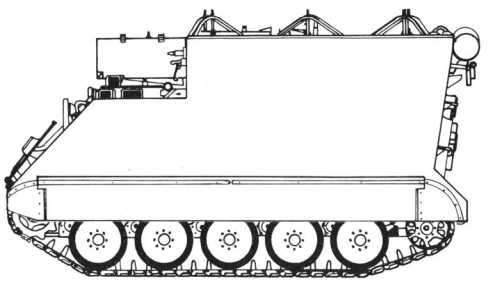
Swiss Feuerleitpanzer



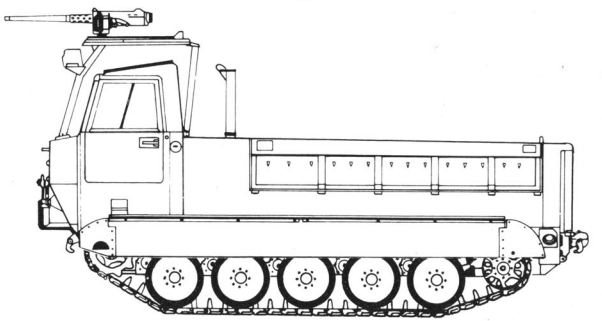
Lynx



XM806E1 Recovery

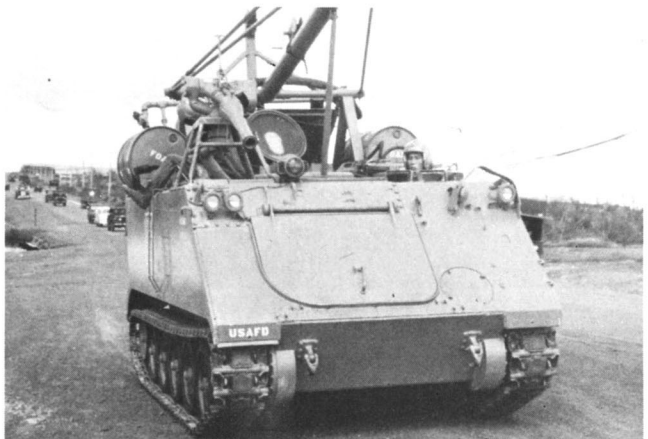


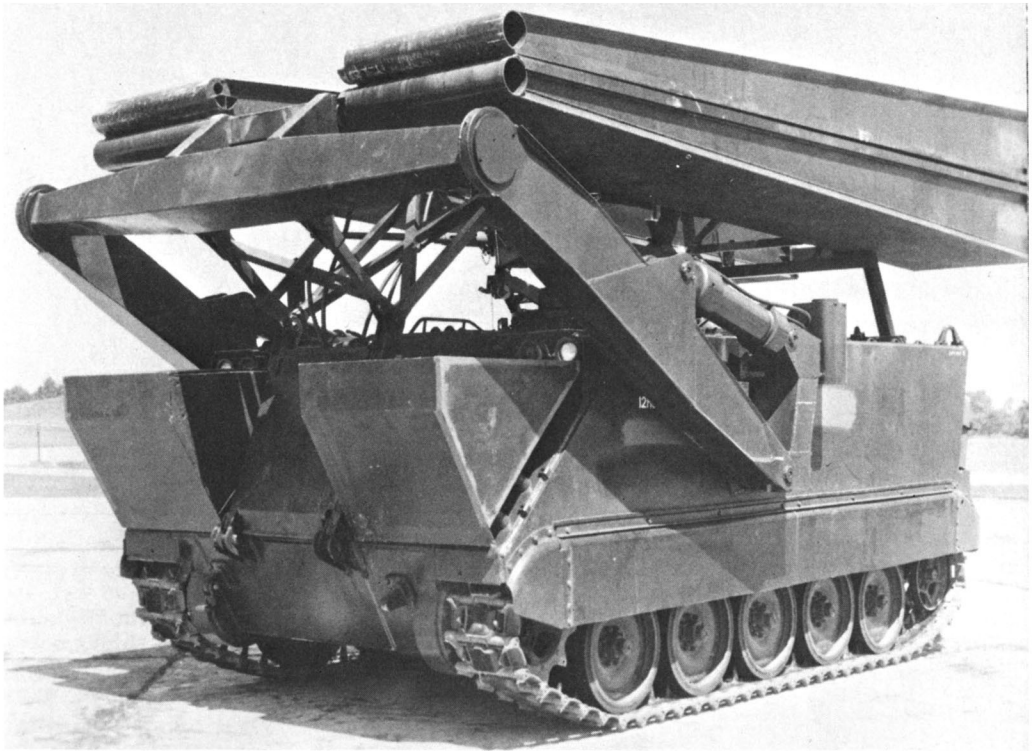
M577A1

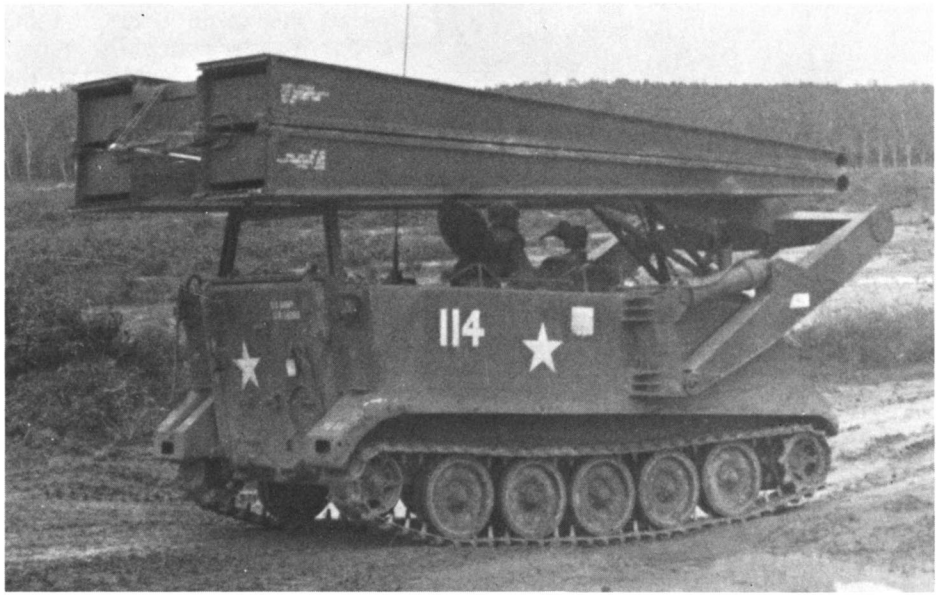


M548

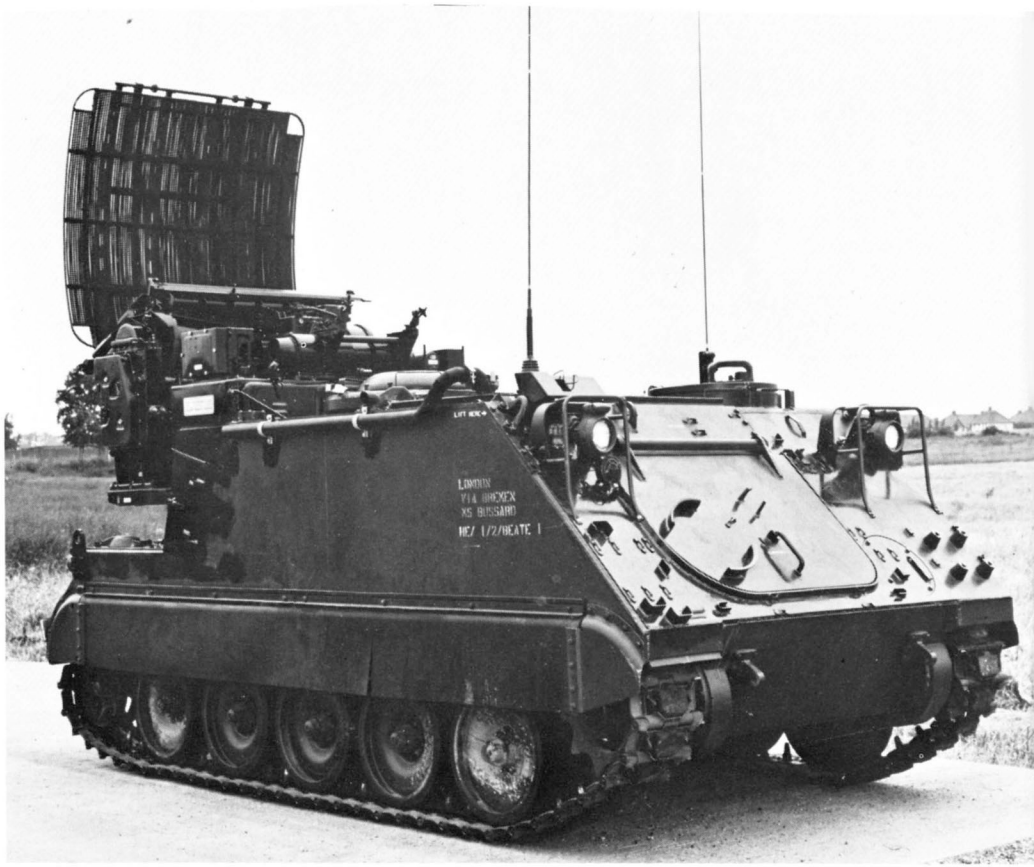
Three variants seen in US service. [Below] an M806A1 Recovery Vehicle is seen in operation. The entire inside area has been given over to the winch. Additionally, a collapsable winch tower is stowed on the hull roof, and two large spades are mounted on the rear quarters. [Bottom] An M113 painted red and converted to a fire truck at the Army's Long Binh base. It is equipped with two 55 gallon drums of Jet-X foam and a spreader nozzle mounted on a 27 foot boom. [Right] An M113 Light Assault Bridge, was devised at Fort Belvoir in response to demands from the Army in Vietnam, designed in kit form to be able to be mounted in the field. This test example has large floatation cells added to the front. [Right Below] A Light Assault Bridge in use in Vietnam, here with "A" Troop, 4th Cavalry, 25th Infantry Division, August 3, 1969. The thirty foot span proved easy to use and the vehicle was a popular one. [US Army]





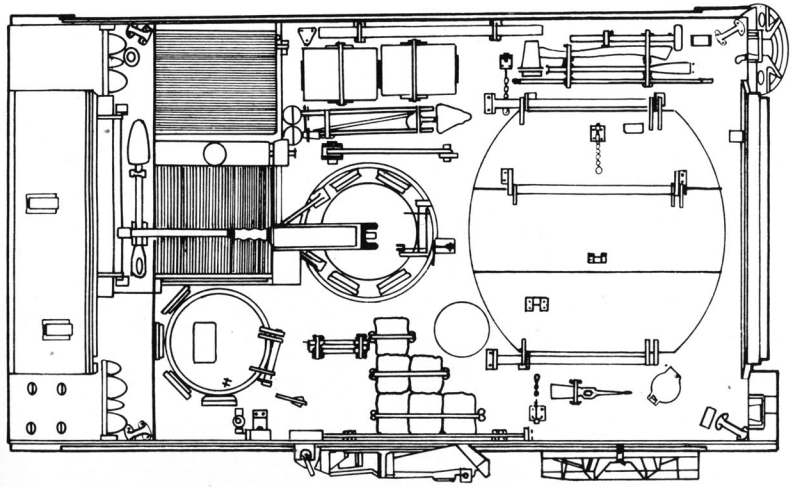


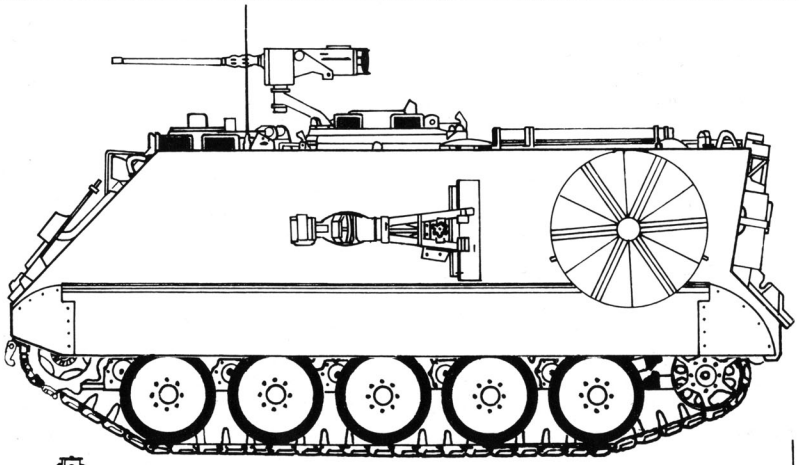
Four other M113 variants, involving the mounting of various missile or radar systems on the APC, with little or no modification of the basic shape. [Above] The simplest of the conversions was the mounting of US Army's TOW second-generation wire-guided antitank missile. The pedestal mount is bolted to the forward edge of the cargo hatch, behind the commander's cupola, served by two crewmen standing in the hatch. [Hughes Aircraft Corp.] [Left] Mounted on the rear of a West German M113G, the RATAC battlefield radar was developed jointly by the French and Germans. [Standard Elektruk Lorenz] [Above Right] Another modified M113G in German service, this one mounting the highly successful HOT missile. Like the American TOW, the Franco-German HOT is a sophisticated wire-guided antitank missile. [MBB GmbH] [Right] Seen on a modified M113, this mobile mount of the EMI Green Archer Mk 2 mortar locating Radar is in service with the German, Danish and Italian Armies. [EMI Electronics Ltd.]

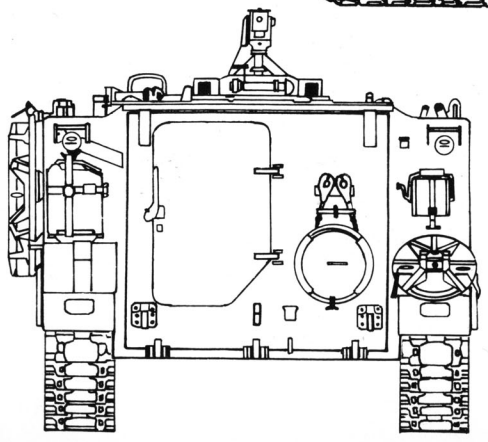


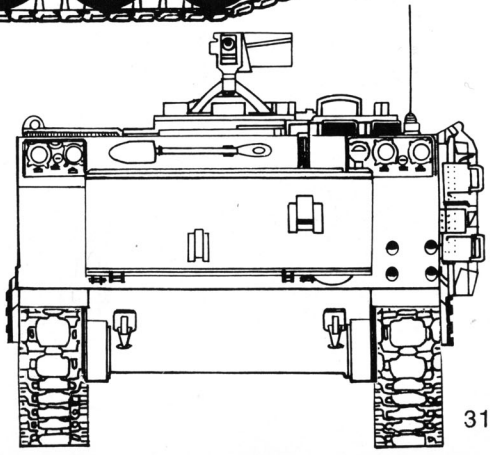
M106A1s mounting a 107mm mortar of the mortar Platoon, "F" Troop, 11th Armored Cavalry Regiment fire on Hill 95 in III Corps Area in an assault on June 15, 1970. The four vehicles of the platoon are drawn up rear to rear to make ammunition supply easier, all being fed from a common dump. Of interest is the fact that all have ACAV kits added, the side M60 mounts being fitted to the inside of the open top hatches which were obviously intended to be left open permanently. Because of the cramped interiors of the mortar carriers, the personal effects of the crew are stowed in the space between the open trim vane and hull front. [US Army]

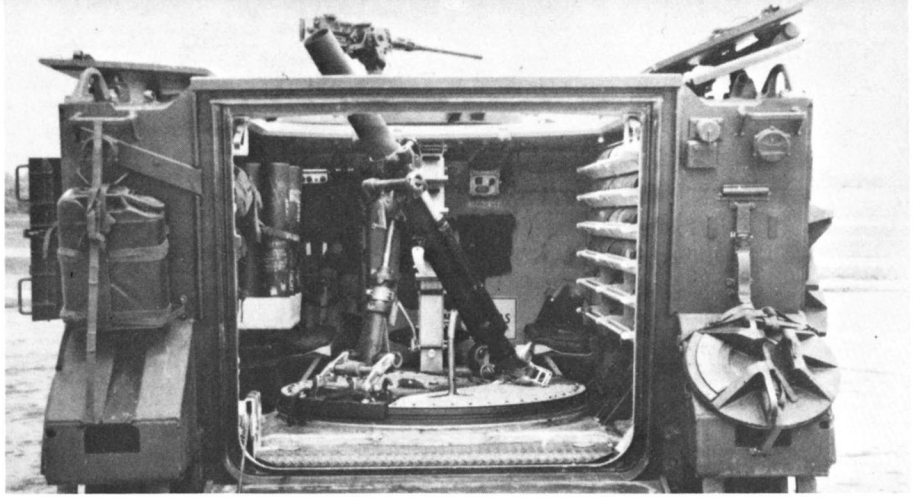
M106





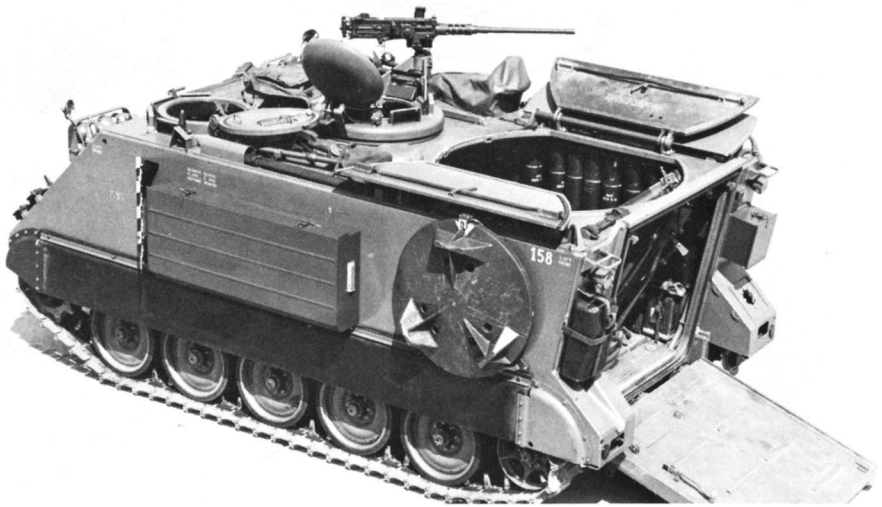






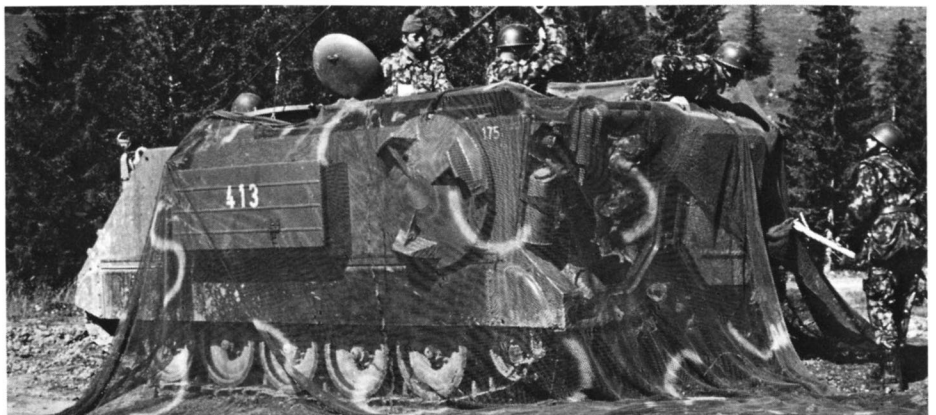
[Above & Below] The two standard US Mortar carriers, the M106A1 and M125A1. The primary difference betwen the vehicles was in the size of the weapon, the M106 at the top mounting a 107mm mortar and the M125 below with a 81mm. While there are some detail differences in stowage, the basic vehicles were identical. Note the mortar base on the right rear fender, missing on this M125, allowing use of the weapon away from the vehicle. The steel matting on the door of the M125 was to improve traction for ammo handlers. [US Army]

[Top Right] West German M113A1G mortar carrier with 120mm mortar. This vehicle is based loosely on the M106, having a different hatch arrangement and armament. [Bundesministerium der Verteidigung]



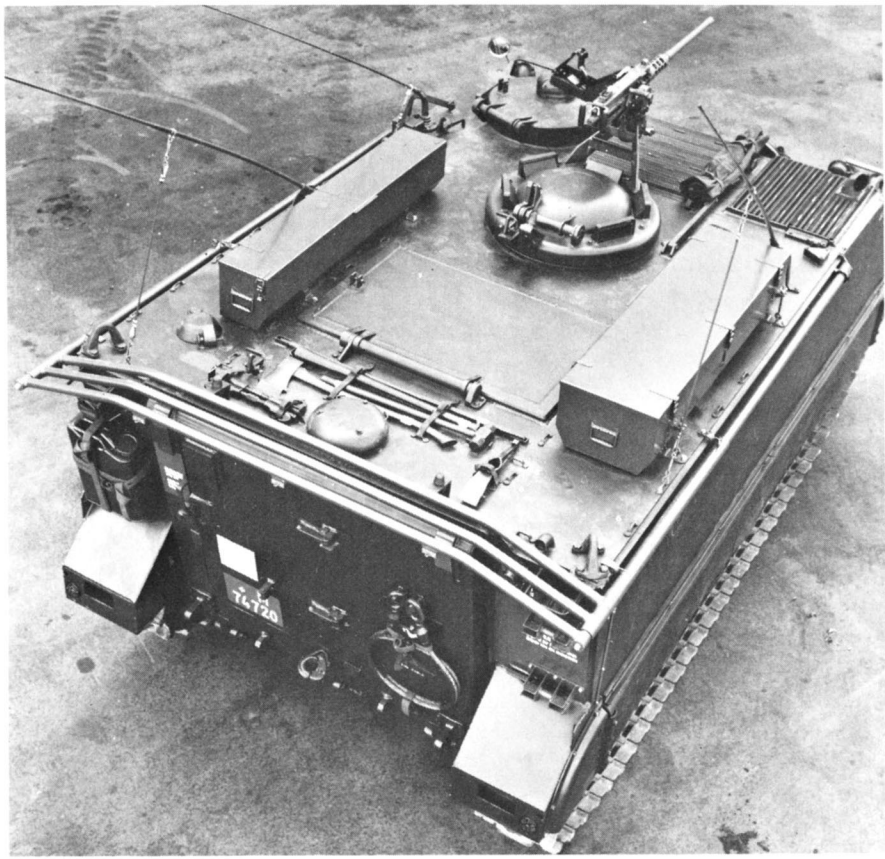
[Right] In 1963, the Swiss Army acquired a number of M106A1s without armament which were equipped with a Swiss 81mm mortar prior to installation of the more modern 120mm mortar, calling them Minenwerferpanzer 64. [Swiss Army]

[Below Right] Heavily camouflaged Minenwerferpanzer 64 of the Swiss Army. Note protruding tool box and mortar base. [Photo Pierre Izard]



A modified M1113, the Swiss Army Kommando Schutzenpanzer 63 is used as a communications vehicle equipped with additional radio installations and folding tables. The basic vehicle form is not altered. [Stephen Tunbridge]

[Above Right] Similar to the contemporary American M113 MCPI two Swiss Army Feuerleitpanzer 63 are seen here with tent mounted at rear to provide additional headquarters accomodation. Note the telescopic large pole antenna. The cockscombs are unofficial markings. [Stephen Tunbridge]



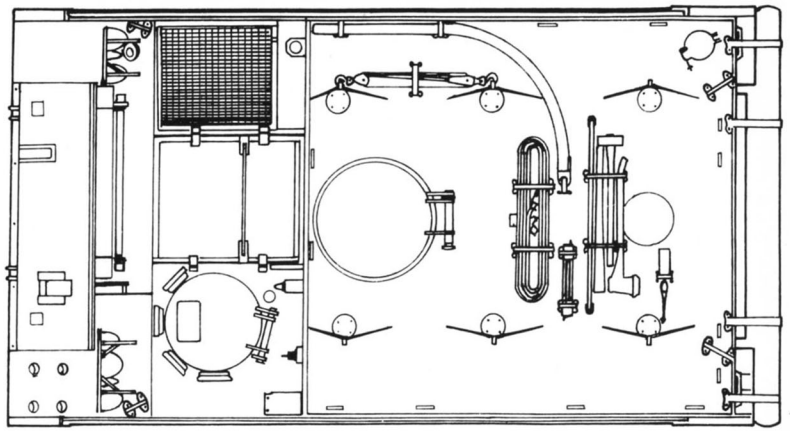
A view of a Swiss Feuerleitpanzer 63 used as fire control post for M109U self-propelled guns. The main additions to the basic M113 are toolboxes, additional radio installations, folding tables and rails for extension tent. [Swiss Army]

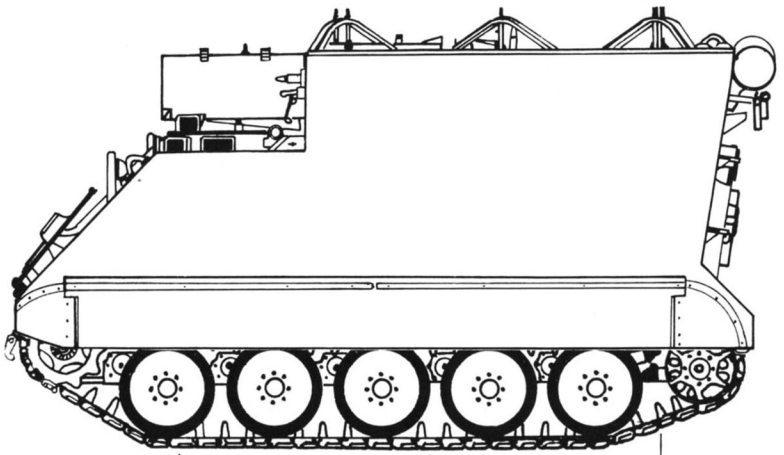
Two M113MCPs [Mobile Command Posts] are seen with tents extended near Lai Khe in January 1968. They are vehicles of Co.B, 2nd Infantry, 1st Infantry Division. The MCP was a stopgap measure, pending the quantity production of the M577. It filled the need for a command vehicle, being simply an M113 filled with extra radio gear and having an extra pole antenna and a collapsible tent extension enclosing work and sleep quarters. Note the MCP in the background has a "requisitioned" attack helicopter armored seat for use as an observation post. This was a common feature of MCPs. Both vehicles feature shielded .50 cal MGs. The boxes on the rear hull deck of the foreground vehicle are spare batteries for the radios. [US Army]

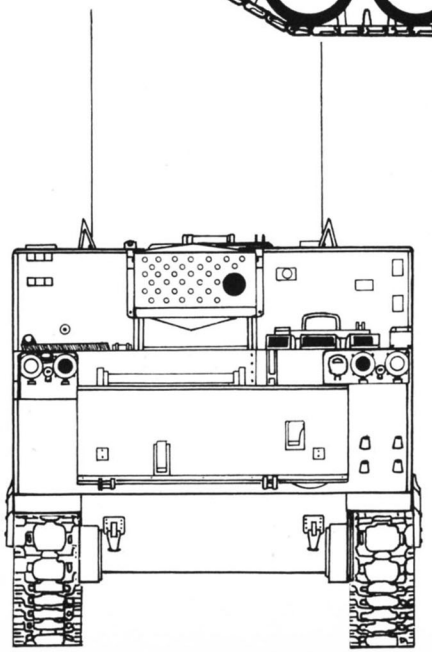
A US M113MCP is seen with the armored helicopter seats mounted on the rear and a shielded .50 cal MG. This particular vehicle acted as a makeshift command station in Vietnam. [James W. Loop via Robert J. Icks]

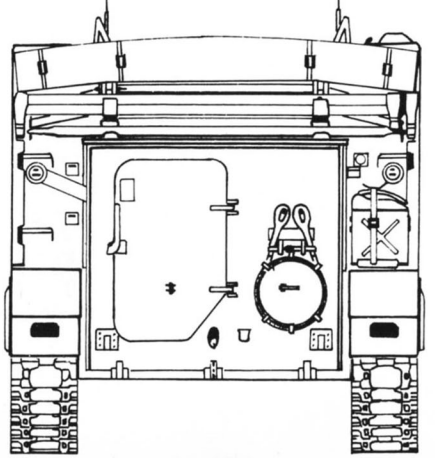
A little engine trouble. An M577A1 of the 11th Cavalry sits by the side of a road in Germany. The rolls of concertina wire which had been carried on the trim vane have been removed, the vane itself released and dropped and the engine hatch propped open. The cylindrical object in the engine compartment is the air clearner and is the same sand color as the basis of the camouflage. The lighter colored housing visible in the front of the compartment is the differential and is off-white in color. The vehicle is in one of the variations of the new US Army four-color camouflage. In this case, the basis color is sand with large patches of red-brown and medium green and small areas of black. The stencilling and star on the side are black while the unit codes in front are white. The only unpainted areas of the vehicle are the rubber skirts and track. Note how the pattern is continued onto the inner face of the trim vane. [Pierre Touzin]

M577

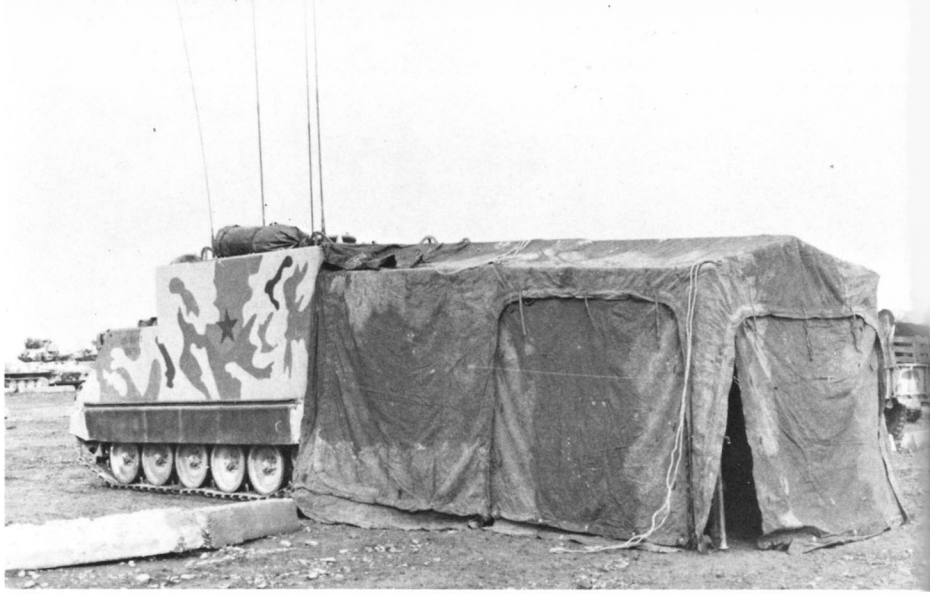








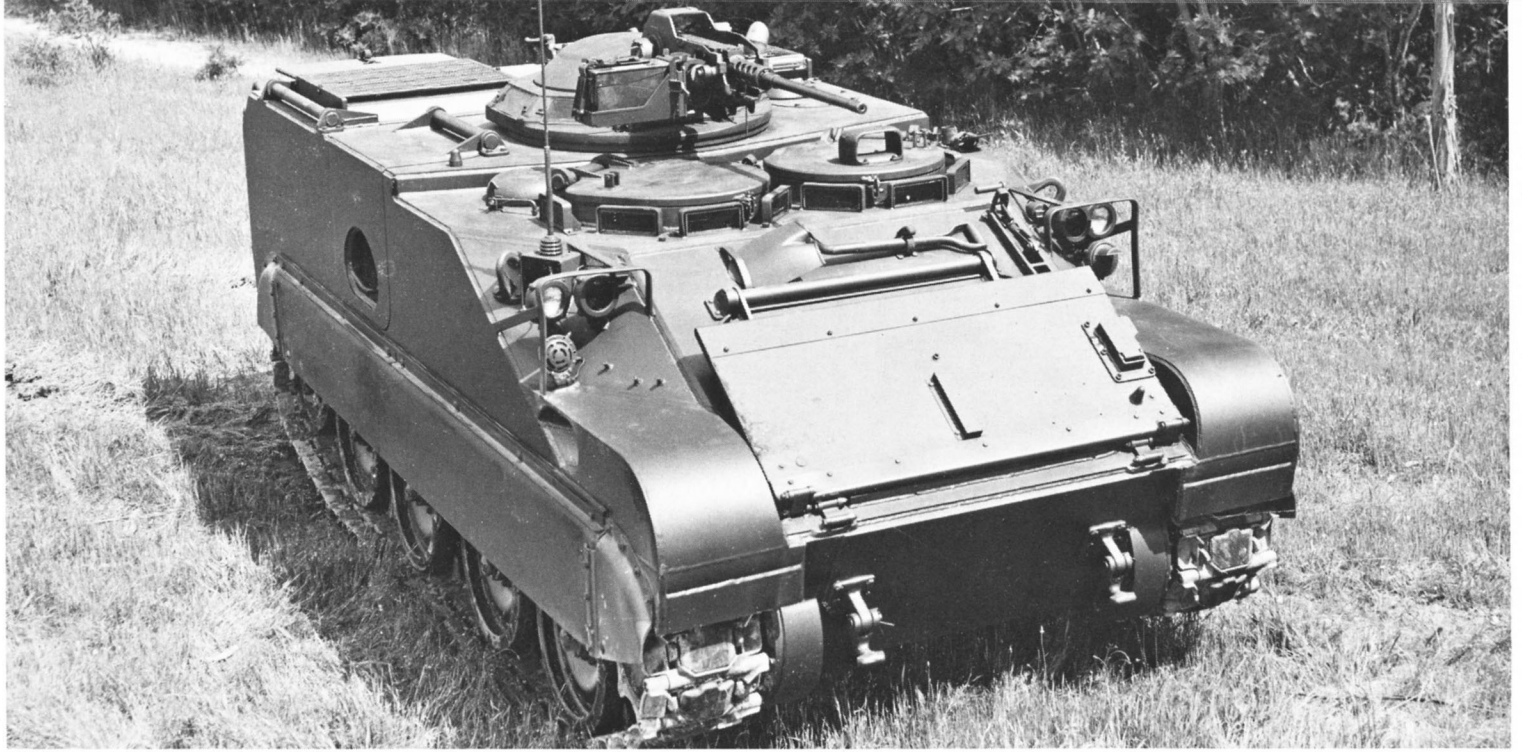
[Left] A very early M577 of the 4th Armored Division in Germany is seen in Germany, October 1967. It is possible that this is a converted M113 as a weld seam can be noted between the basic hull and the built-up superstructure. This vehicle sports an early experimental camouflage that preceeded the present four-color system. This was a combination of wavy shapes of standard matt olive drab paint and gloss olive drab enamel. While the same pigment is used in both, the difference in medium and surface makes them appear as very different colors. [Bill Sullivan]



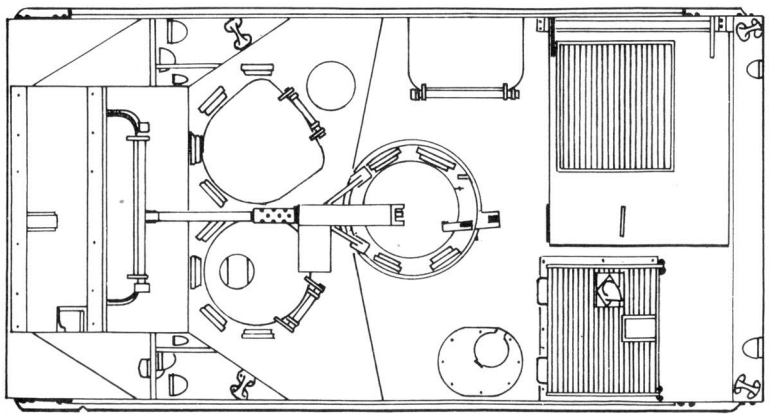
A clear view of the front of an Australian M577A1 "Bullshine". From this angle, and by comparing the shape with the M113 in the background, it is easy to see how the M577 is made by adding a boxlike extension to the rear two-thirds of the basic vehicle. The built up ventilated container in front of the superstructure is a housing for a generator-ventillation system, missing here. [Judy Wilson]

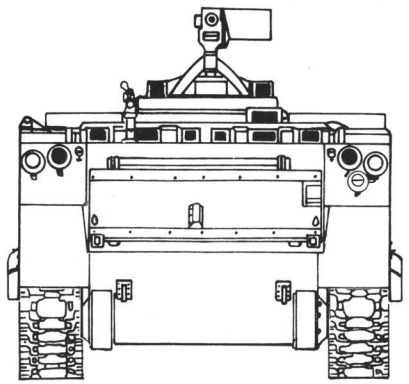
[Above & Below] Two views of the rear quarter of M577s in Germany. Both are in the four-color camouflage but display different patterns. Both also use black stencilling though only one has the star. The vehicle above has its tent extended, that below has it collapsed and stowed, along with the poles, above the rear door. While the tent seen above appears to be Olive Drab Canvas, the other is a sand color matching the camouflage basis. [Pierre Touzin and Michael Leidler]

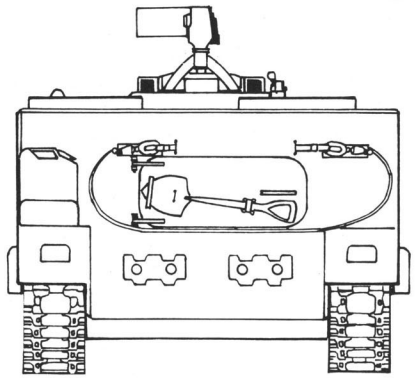
The M113 Command and Reconnaissance Vehicle [M113C + R] supplied to Netherlands Army has a three-man crew: commander, driver and radio operator who acts as observer. While the chassis has been shortened and the superstructure lowered and altered, the family resemblance can still be seen.

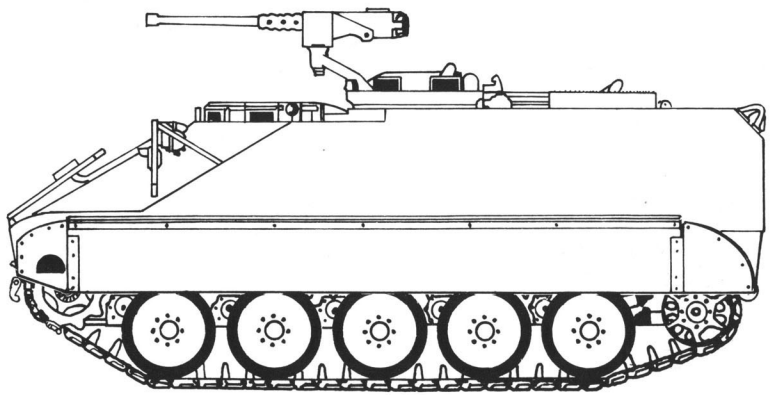


M113 C & R









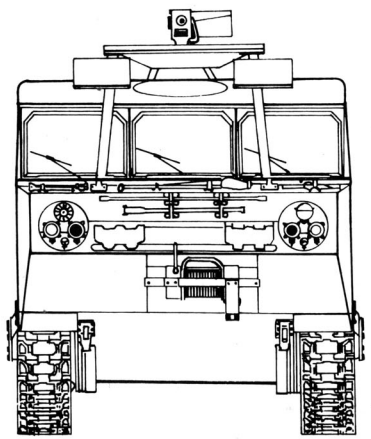
Oerlikon 25mm gun turret GBD-A05 mounted on Netherlands Army Command and Reconnaissance Vehicle. Note the national flag as well as the yellow bridge classification disk which is standard on all NATO fighting vehicles. The M113 C + R is rear-engined, though the differential and drive sprocket are still at the front. The engine is aluminum in an attempt to keep weight down as much as possible, so that the C + R will remain amphibious with reduced buoyancy.

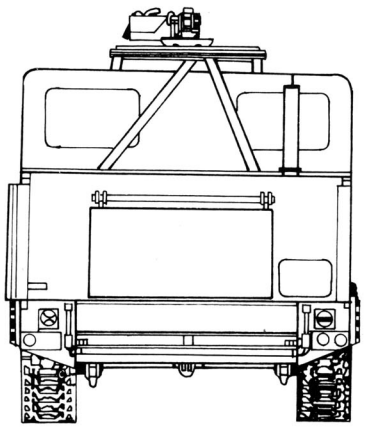
[Above Right] Lynx Command and Reconnaissance Carriers of the Canadian Army are seen in column on maneuvers. The greatest difference between the Lynx and the basic C + R is the relocated turret [moved forward to replace the radio operator's position] and the addition of an extra buoyancy cell on the trim vane to compensate for the altered weight distribution. [Canadian Army]

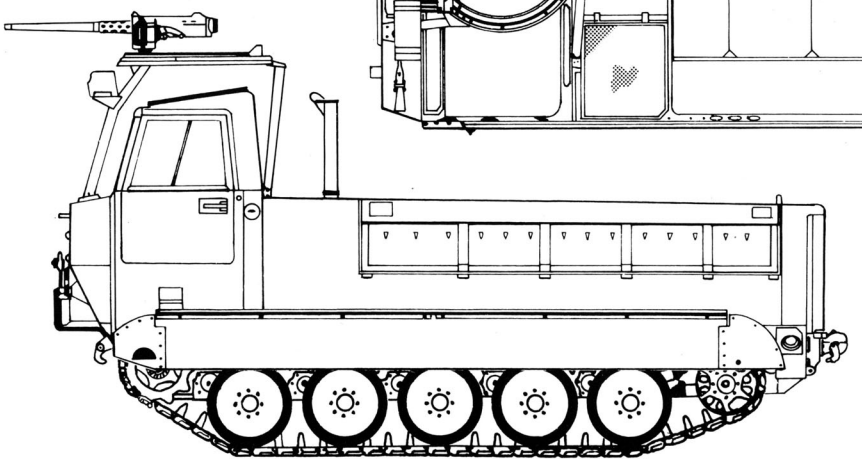
A part of a Canadian detachment sent to Cyprus in 1974. Note the United Nations flag on hull front and overall white paint for easy recognition. A supplementary .30 cal. MG has been added to the revised radio operator's position.

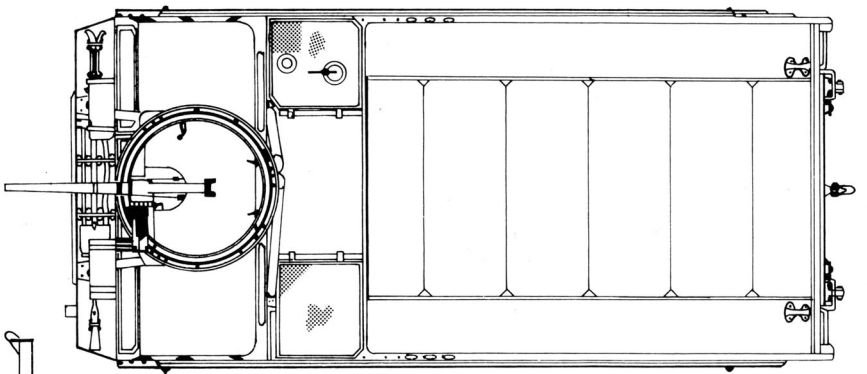
A line-up of vehicles of the 11th Cavalry in Germany. The central vehicle is a basic M548 Cargo Carrier, a truck-bodied, unarmored M113. The M548 itself has been modified into dozens of derivative vehicles. To the right is an M109 SP 155mm Gun, a distant relative of the M113. [Pierre Touzin]

M548

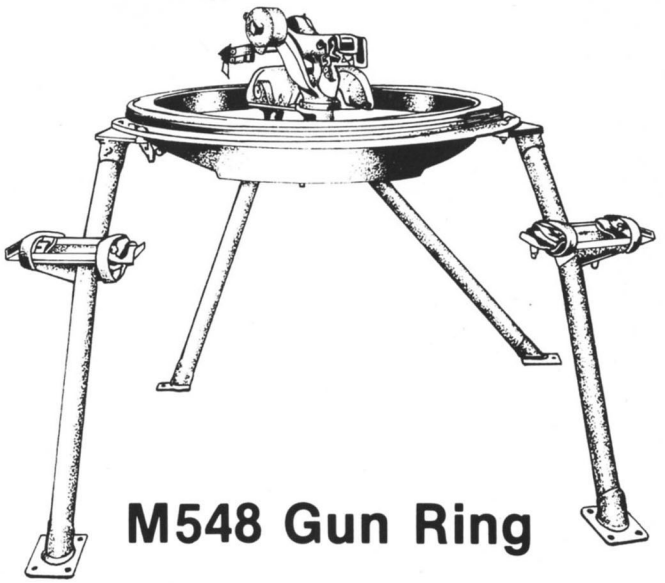






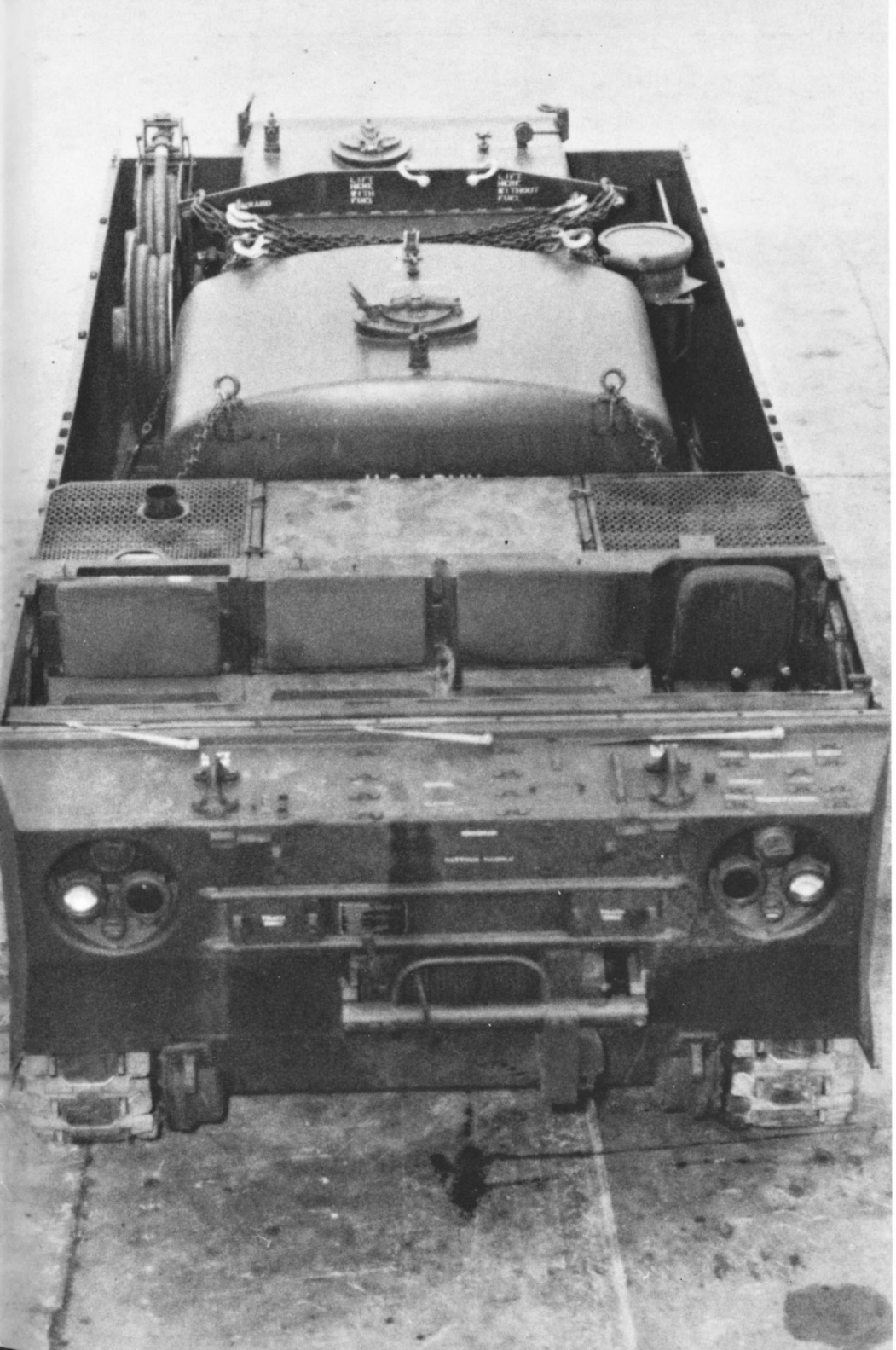


[Left & Left Below] **Swiss and Australian M548s give good views of both sides of the vehicle. Most of the Swiss vehicles are the artillery resupply variant which differs solely by the addition of a trolley and hoist along the centerline above the cargo bed. With the canvas tilt in place, the variants are indistinguishable. [Swiss Army and Australian Army]**



M548 Gun Ring

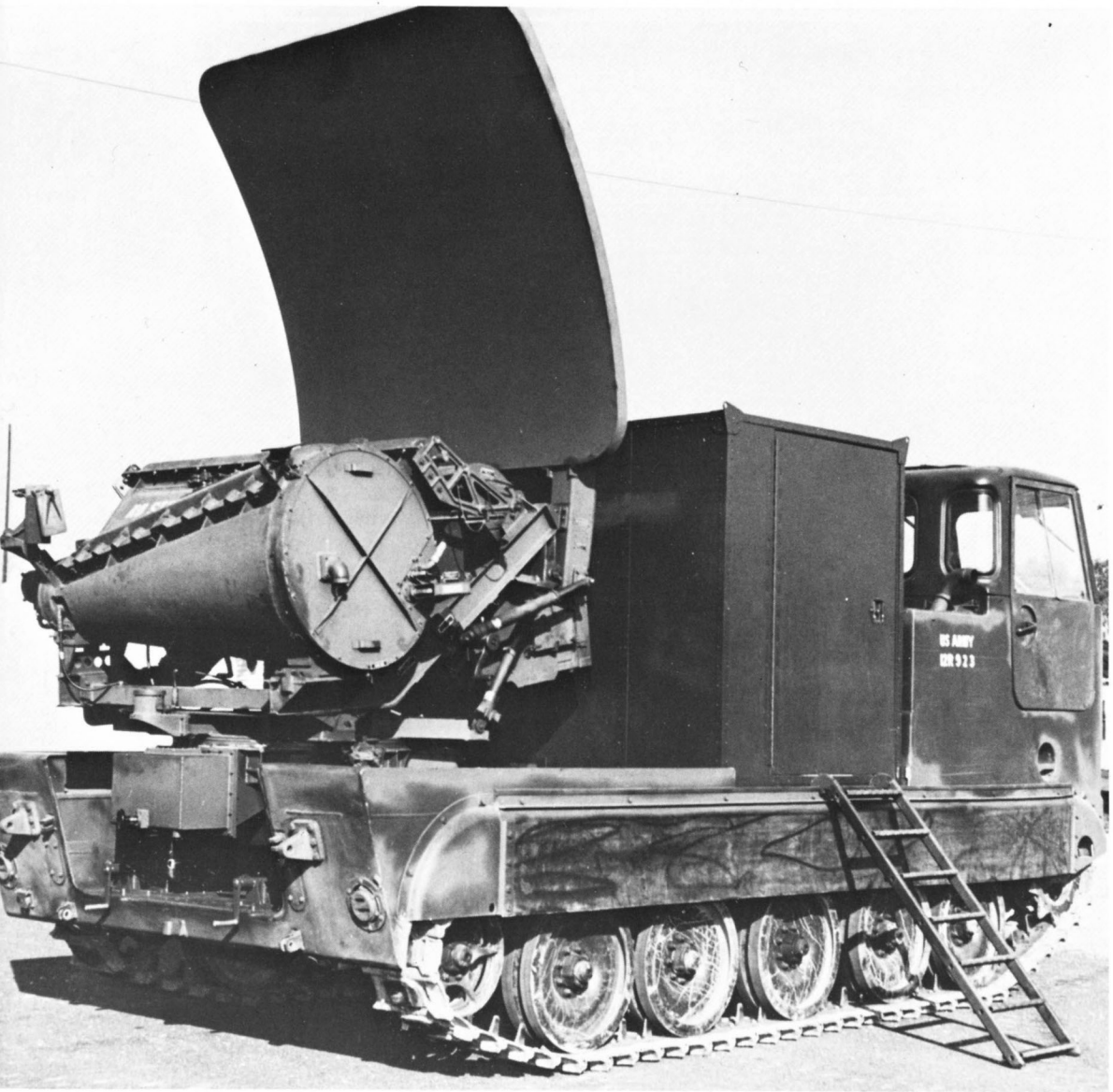
A US M548 Artillery Resupply Vehicle with 1500 pound capacity hoist is seen here. This shot gives a good idea of the large cargo area of the truck-bodied series. [FMC Corporation]

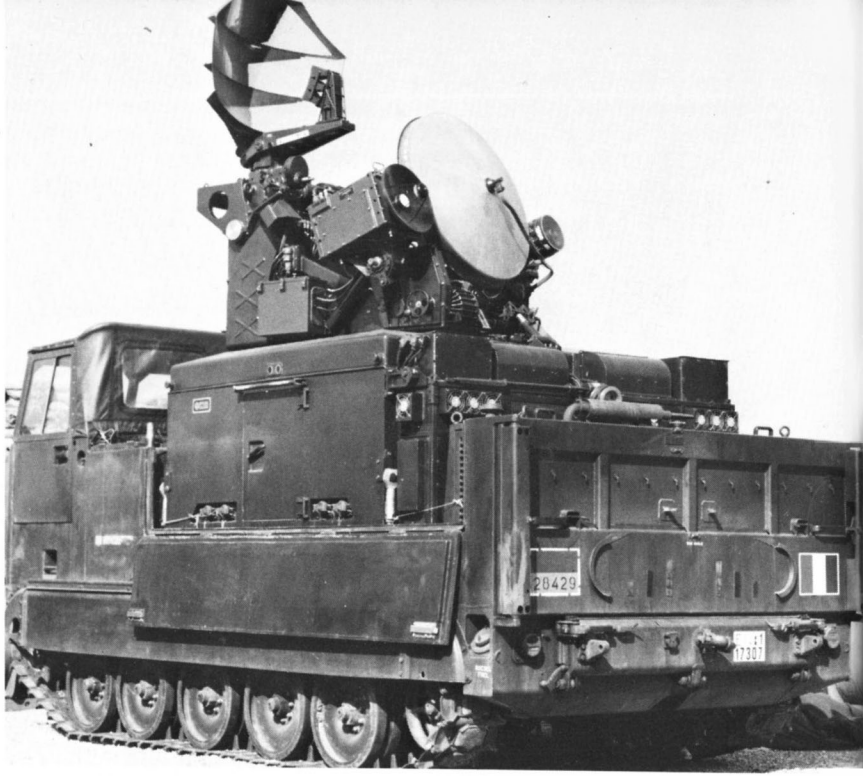


The M548 flamethrower resupply vehicle has been specially modified to mix thickened fuel [jellied gasoline] and compressed air for use by M132 flamethrowers. This vehicle has been modified with a lightly armored cab. [FMC Corporation]

[Left M548 liquid transporter. A variety of standard tanks may be placed in the cargo bed and can carry either oil, water or other kinds of fuel compatible with the system. With the detachable cab structure and tilt bows removed, the M548 presents a very low profile. [FMC Corporation]

XM696 Recovery Vehicle fitted with hydraulic hoist winch and outriggers to increase lateral stability is only one of many experimental variants on the M548 chassis. [FMC Corporation]

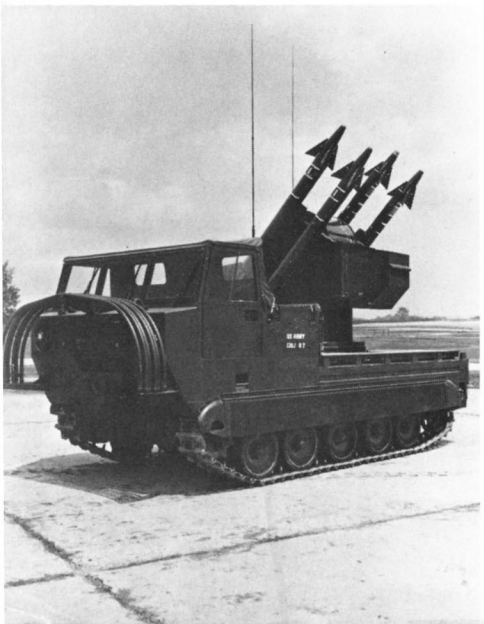




[Above] Adapted by the US Army, this M548 has been modified into a radar vehicle by the addition of an AN/MPQ-4A battlefield radar system. The M548, because of its large cargo area is very amenable to such alterations. [FMC Corporation] [Above Right] An Italian M548 is seen here as the radar vehicle used in conjunction with the Indigo MEI surface-to-air missile system. [Siotel-Sistemi Ellettronici SpA] [Right] A Swiss M548 is seen here carrying the Contraves Skyguard System which provides low-level air-defense fire control for both AA guns and missiles. [Contraves AG]

The M4A1 twin 40mm gun carrier is based on a M548 chassis. The turret is lifted bodily from an M42 Duster.

[Right & Below] The self-propelled M727 Hawk missile launcher with hydraulically orientable blast deflector protecting the cab area during missile launching is seen in travelling and firing positions. [US Army and FMC Corporation]



[Above & Left] The XM730 Chaparral launching vehicle is seen here during trials and back on the range after being cleaned up. In the test view, the cab and the tilt bows have been removed and the vehicle has been camouflaged with an overpainting of Sand. Note the way the missile platform has been dovetailed to fit into the M548's cargo bed. In the "cleaned up" shot, the cab and fender skirts have been refitted and the tilt bows stacked neatly on the rack in front. [US Army and Stephen Tunbridge]

[Right] An M688 transporter/loader is seen positioning a Lance tactical missile on the M752 rocket launcer. Both vehicles are based on the M548, the truckbed being extended, ending in a drop ramp. Both are seen here from the rear. The cab, visible erected on the M688, can be collapsed as on the launch vehicle.

Improving the M113

The requirements became evident in Vietnam for an APC to operate in close cooperation with conventional tanks. This trend in armored warfare had first been recognized in the German Bundeswehr early in the 1950s mainly as a result of successful World War II experience with Panzergrenadier units when tanks and APCs frequently worked closely together. Yet German APC design enabled infantry units to fight independently of the tanks when the tactical situation made this necessary. In this way was evolved the present requirement for a Mechanized Infantry Combat Vehicle, or MICV.

Hand in hand with developments taking place overseas, US domestic design evolved. Based on operational experience in Vietnam, an M113 was modified at the Infantry School, Fort Benning, to carry infantrymen seated back to back, with firing ports allowing them to fire from within the vehicle. This modified M113 in turn led to the development of the XM734, more or less similar in basic concept, except for the incorporation of a centrally mounted cupola equipped with twin MGs.

The MICV 65, later known as the XM701, manufactured in 1965 by the Pacific Car and Foundry Company was the first MICV to be built in the United States. Five XM701 prototypes were produced and equipped with a 20mm gun turret as well as rifle ports. Owing to excessive weight, which reached 23.7 metric tons as opposed to the 10.9 metric tons of the M113A1, development was discontinued.

This led in 1967 to a US Army contract with FMC for the development of an MICV vehicle based on the M113 design. Two XM765 prototypes which followed incorporated the same features as the XM701 mentioned above, i.e. a 20 mm gun turret and rifle ports and vision blocks. Although these improvements met much of the criticism of the M113, they did not satisfy the exacting requirements of the US Army.

In line with the FMC development programs on MICV to meet US Army requirements, developments on the basic M113 were continued both in the US and Italy. The first result was the Product Improved M113A1 which combines the hull configuration of the XM765 with the proven automotive design of the basic M113A1. FMC continued work on the XM765 concept (turret, sloped side armor, rifle ports). This led in 1973 to a number of prototypes known as the Armored Infantry Fighting Vehicles, or AIFV. Tests of the AIFV have been carried out by several foreign governments including Belgium, the Netherlands, and Italy, and in 1976 an order for 850 was placed by the Netherlands Government. The AIFV concept also aroused considerable interest in Italy where an Infantry Armored Fighting Vehicle (IAFV) has been developed by the Servizio Tecnico della Motorizazione of the Italian Army and is in large-scale production for the Italian forces with a view to export.

Based on experience with the MBT 70 tank, a searching cost effectiveness exercise was conducted on the 1967 MICV specification which was then withdrawn and new 'austere' MICV, or MICV 70, was defined. FMC was awarded a $29.3 million contract for 17 prototypes covering a 4-year development period. The first prototype, (XM723), was completed in 1974, the configuration of which had much in common with the XM765. The production models are due to be delivered from 1978 onwards to replace the M113s still in service with the U.S. Army in Western Europe.

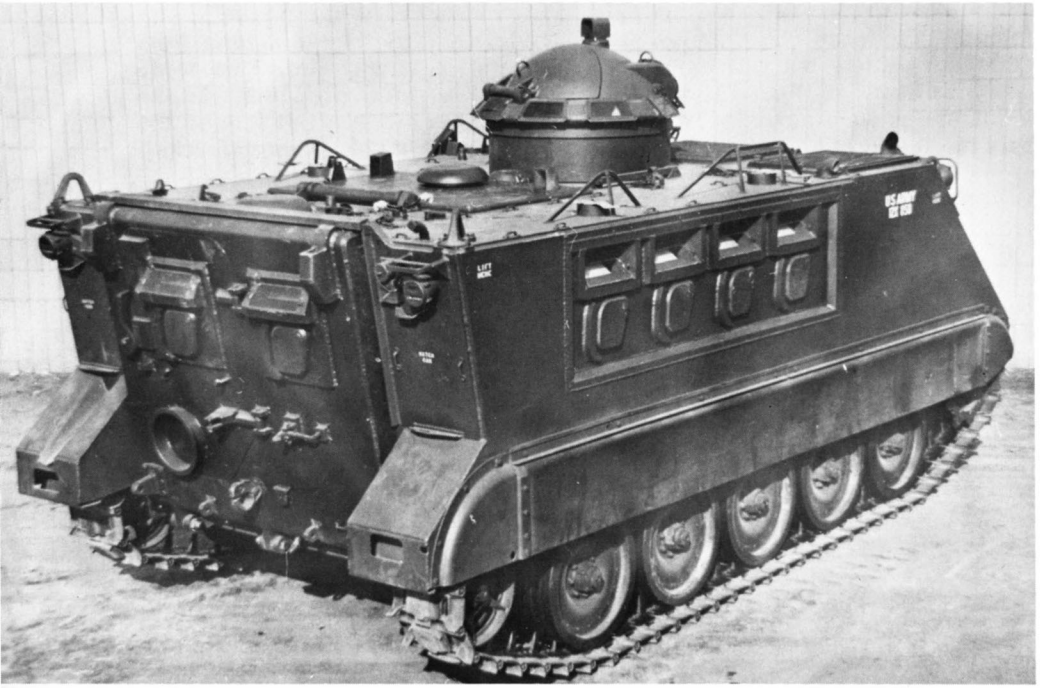
Following the issuance of a US Army requirement for a MICV 65, the Pacific Car and Foundry Company developed five prototypes of the XM701 with a 20mm gun turret and coaxial machine gun as well as side sloped armor incorporating firing ports. Excessive weight and dimensions led to the project being abandoned. Note that this chassis is in no way related to the M113 or its prototype despite the strong resemblance of the five-wheeled running gear and trailing idler. [Robert J. Icks]

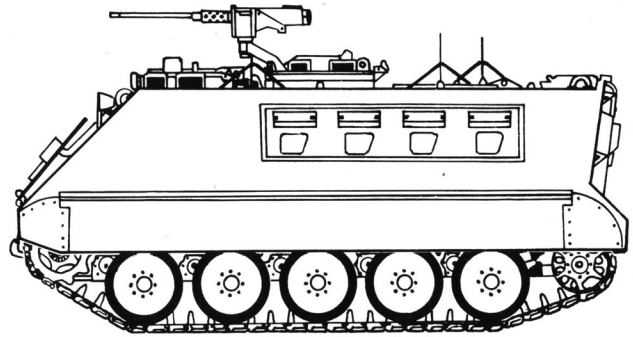
Vietnam experience showed that crews could not use their weapons from within the vehicle without dangerous exposure to enemy fire. This M113 was modified at Fort Benning to overcome this problem. These modifications were never incorporated in production models, but formed the basis for the development of a similar vehicle, the XM734. [Robert J. Icks]

MICV Development

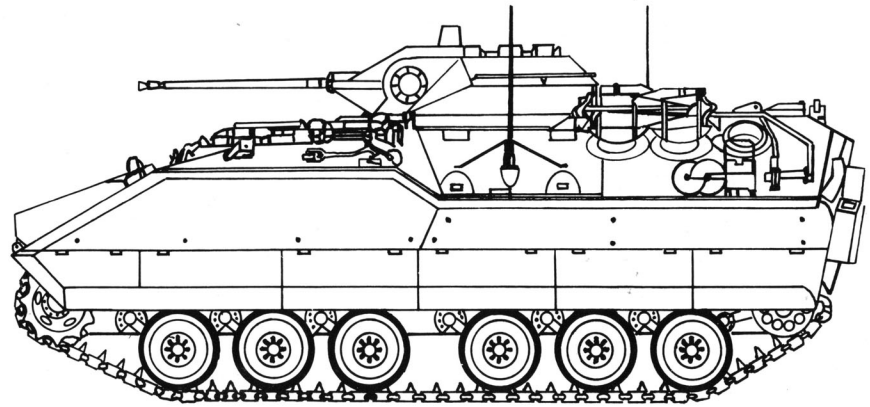
The first XM734, with wooden mockups of the side firing ports and vision ports was a simple modification of a basic M113. [FMC Corporation]

The "production" XM734 with its relocated fuel tanks was equipped with ten firing ports and a twin MG cupola. This vehicle did not reach production, but the general concept was further developed as the XM765. [US Army via Robert J. Icks]

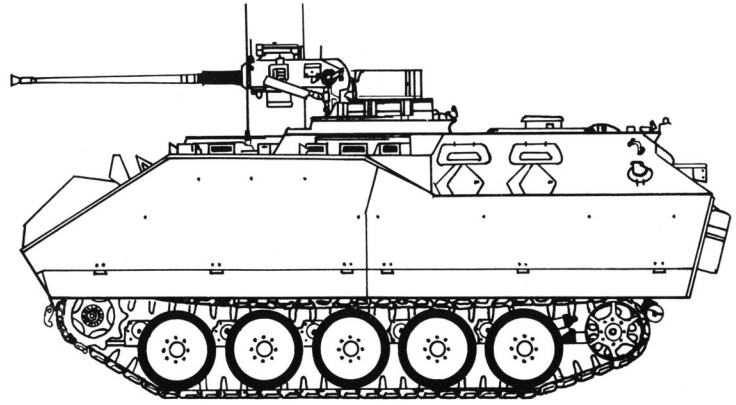




XM734



MICV XM723



AIFV

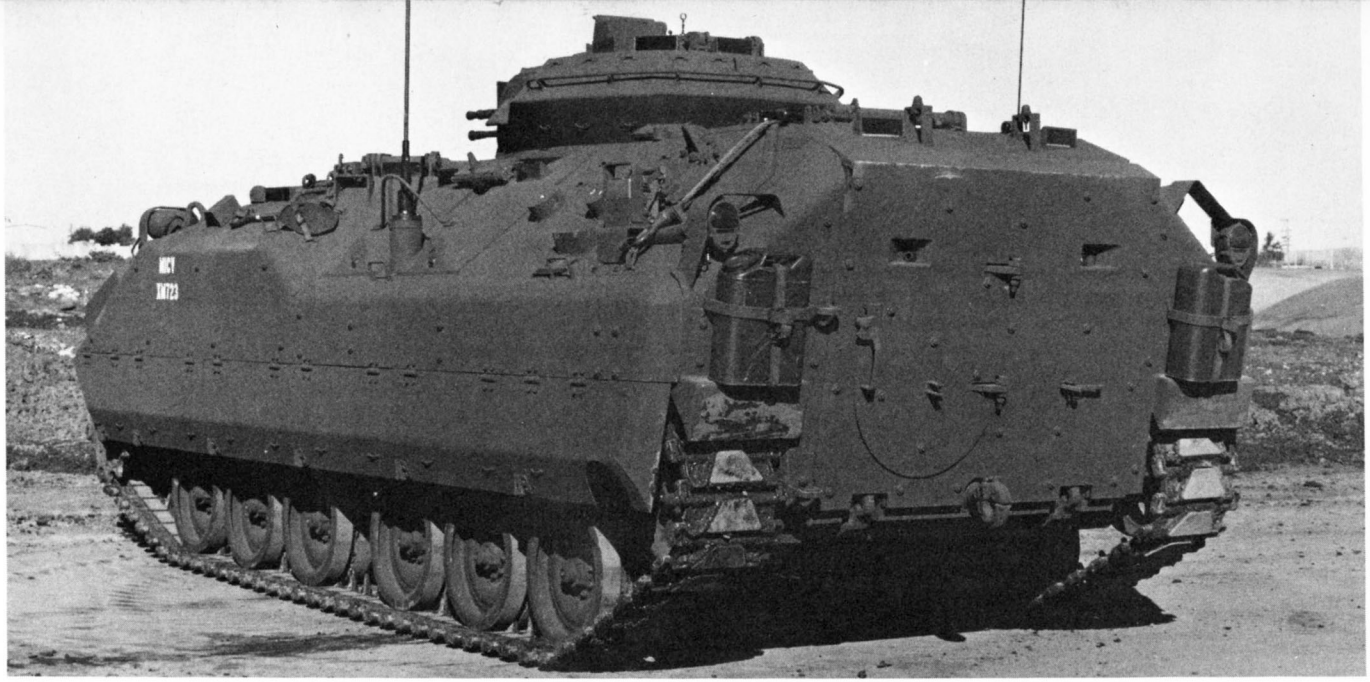
[Left & Below Left] **The PI M113A1, similar to the XM765, but in this case a private venture by the FMC Corporation, is seen here with two different turrets. In the above photo, a low-profile .50 cal turret is fitted while below a 20mm gun turret is fitted. While this vehicle seemed to solve many of the problems inherent in the M113, in particular the lack of ballistic shape and the lack of vision and firepower by the crew, the design was rejected by the US Army. The design was then offered to other countries as the Armoured Infantry Fighting Vehicle. [AIFV]. [FMC Corporation]**

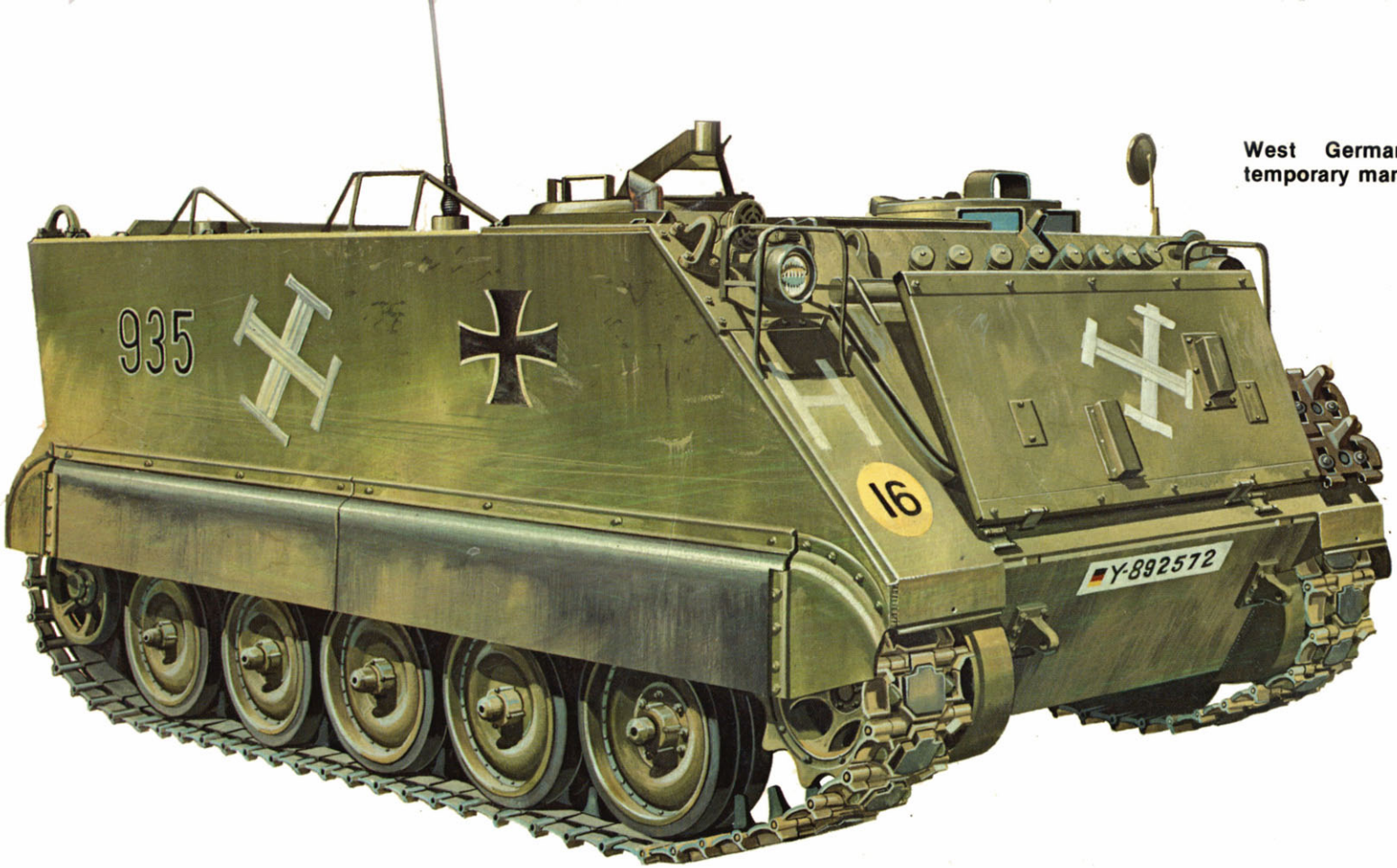
A prototype AIFV with one-man enclosed weapon station. This version has slightly simplified armor arrangement in relation to the PI M113A1. The sheet steel buoyance tanks give the additional advantages of spaced armor. The Netherlands Army recently ordered 850 of these vehicles, thus becoming the first nation to introduce this equipment on a large scale. A full range of kits which can be adapted to the basic AIFV includes: Command Kit, Cargo Kit, Mortar Carrier Kit, Ambulance Kit, Radar Kit and TOW Missile Kit. [FMC Corporation]

[Left, Above & Below] The production version Armored Infantry Fighting Vehicle for the Dutch Army is seen here equipped with an Oerlikon type GBD-B20 25mm gun turret. After extensive trials, 850 AIFVs and 350 turrets have been ordered by the Netherlands Government. The production variant differs again in the appearance of the steel spaced armor, the rounded edges being squared off, the buoyancy tanks being made out of welded flat plates.

[Above & Below] The Italians, who had been licence-building the M113, initiated a redesign of the basic hull, coming up a vehicle that looks a great deal like an AIFV, but actually is a much simpler conversion, the Infantry Armored Fighting Vehicle [IAFV], known as Camillino. Improved firepower includes frontal M-2 HB .50 MG as well as rear MG-42/59 MG. The side sloped armor incorporates firing ports. This vehicle is now in full production for the Italian Army. The vehicle below mounts a larger gun in a central turret.

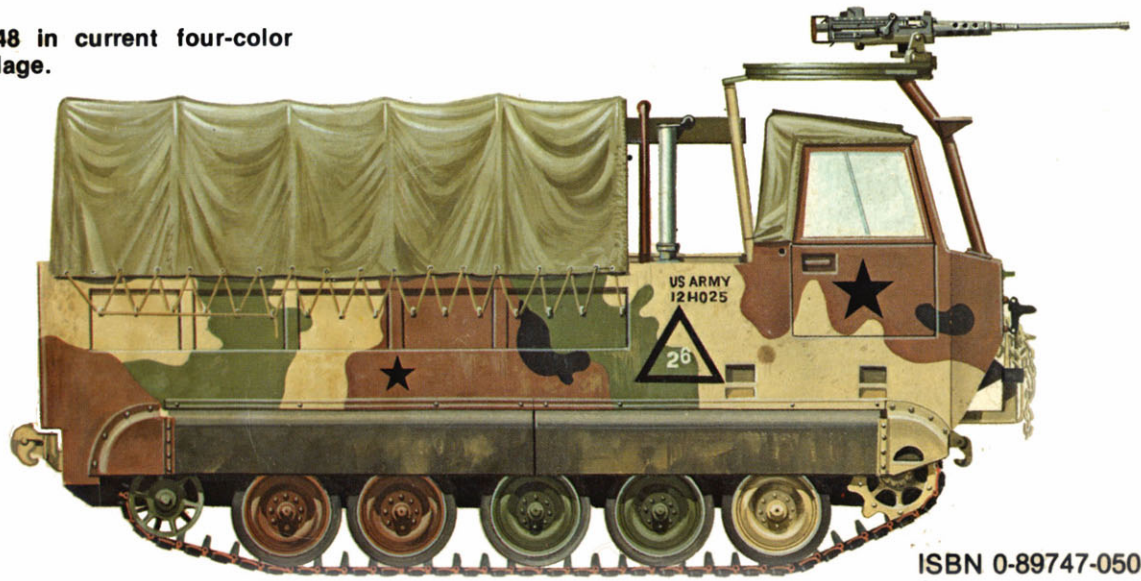
The pre-production XM723 developed in response to the MICV 70 requirements still equipped with the 20mm M139 automatic cannon and coaxial 7.62mm M219 MG. Production models adopted by the US Army will be equipped with the 25mm Bushmaster cannon. Development experience with the PI M113A1 has resulted in a reduction in the number of side rifle ports from four to two in comparison with the XM765. The sloped side armor is reinforced with spaced steel buoyancy tanks. Note the additional road wheel. [FMC Corporation]





West German M113 G in temporary maneuver markings.

US M548 in current four-color camouflage.



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